NOTICE

All drawings located at the end of the document.

HEALTH AND SAFETY PLAN

OPERATION OF DECONTAMINATION FACILITIES

ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE

RF/ER-96-0049 Revision 0

Prepared for: **Rocky Mountain Remediation Services, LLC**
Rocky Flats Environmental Technologies Site
P.O. Box 464
Golden, Colorado 80402

Prepared by: **Resource Technologies Group, Inc.**
3900 S. Wadsworth Blvd., Suite 155
Lakewood, Colorado 80235

ADMINISTRATIVE INFORMATION

Site: Rocky Flats Environmental Technology Site (RFETS), Golden, Colorado

Project Name: Main and Protected Area Decontamination Facilities

Project Number: 960246

Date Prepared: June 25, 1997

Approvals

I have read and approved this HASP with respect to project hazards and regulatory requirements.

Bart Clay W Conroy — 7/14/97

RTG HS Manager
Bart Conroy

Date

Michael Bemski — 7/15/97

RMRS Project Manager
Michael Bemski

Date

M.D. Schreckengast — 7-9-97

RMRS HS Supervisor
M. D. Schreckengast

Date

Scott A. Newsom — 07/09/97

RFETS Radiological Engineering
Scott Newsom

Date

TABLE OF CONTENTS

LIST OF FIGURES AND TABLES

FIGURES

TABLES

REFERENCES

Code of Federal Regulations (Titles 10, 29, 40, 49)

Comprehensive Environmental Assessment and Response Program (CEARP) Installation Assessment (DOE 1986a)

Resource Conservation and Recovery Act (RCRA) Part A

Comprehensive Environmental Restoration Program (CERP)

RCRA Part B Permit Application (DOE 1986b, DOE 1986c)

Draft Interagency Agreement (IAG 1990)

Final Phase III RFI/RI Work Plan, Rocky Flats Plant, 881 Hillside Area Operable Unit No. 1 (DOE 1990)

Phase II RFI/RI Work Plans for Alluvial and Bedrock, 903 Pad, Mound, and East Trenches Areas (Operable Unit 2) (DOE 1991a, DOE 1991b)

Final RFI/RI Work Plan for Operable Unit 3, Rocky Flats Plant (DOE 1991c)

EPA National Primary Drinking Water Regulation

Draft Final Phase I RFI/RI Work Plan (DOE 1991d)

Environmental Assessment, Dewatering and RCRA Partial Closure Action on Solar Evaporation Ponds

Final Phase I RFI/RI Work Plan, Woman Creek Priority Drainage (Operable Unit No. 5)

Final Phase I RFI/RI Work Plan, Walnut Creek Priority Drainage (Operable Unit No. 6)

Rockwell International 1988, DOE 1987, DOE 1992a, DOE 1992c

Draft Final Phase I RFI/RI Work Plan, Original Process Waste Lines (OPWL), Operable Unit No. 9

Draft Final Phase I RFI/RI Work Plan, Rocky Flats Plant, Other Outside Closures (Operable Unit No. 10)

Standard Test Methods for Chemical Permeability (ASTM F-739)

NIOSH Pocket Guide to Chemical Hazards (June 1994)

ACGIH Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices (1994-1995)

1.0 INTRODUCTION AND PURPOSE

1.1 PURPOSE

COPY #35

The purpose of this plan is to protect facility personnel, the general public, equipment, and the environment. This plan establishes requirements and provides guidelines for worker safety and hazard identification during subcontractor operation of the Main and Protected Area Decontamination Facilities (MDF and PADF). This document will supersede RF/ER-SAF-93-DCON, which is the preceding decontamination facilities Health and Safety Plan of the same name. The MDF is located in Buildings 903A and 903B. The PADF is at a location designated Building 966A.

1.2 SCOPE

This plan applies to Rocky Flats Environmental Technology Site (RFETS) contractors, subcontractors, and visitors involved in operation, management, or administration at the MDF and PADF in or near Buildings 903A, 903B, and 966A. It addresses comprehensive health and safety concerns involved in routine activities but should not be considered to cover all conceivable situations. This plan should not be construed to override or eliminate any other requirement that applies to work at the MDF, PADF, or field decontamination. All non-routine tasks will be reviewed and a task specific Activity Hazard Analysis (AHA) will be developed. The AHA addresses all steps to be taken to complete the task, the hazards involved, and the protective measures to be used.

Changes to this Health and Safety Plan will require approval signatures from the Rocky Mountain Remediation Services, LLC., (RMRS) Project Manager, RMRS Health and Safety Supervisor, Radiological Engineering (if applicable), and the Resource Technologies Group, Inc., Health and Safety Manager.

Initial approval for all AHA's generated for non-routine tasks will require signatures from the Rocky Mountain Remediation Services, LLC., (RMRS) Project Manager, RMRS Health and Safety Supervisor, and Radiological Engineering (if applicable).

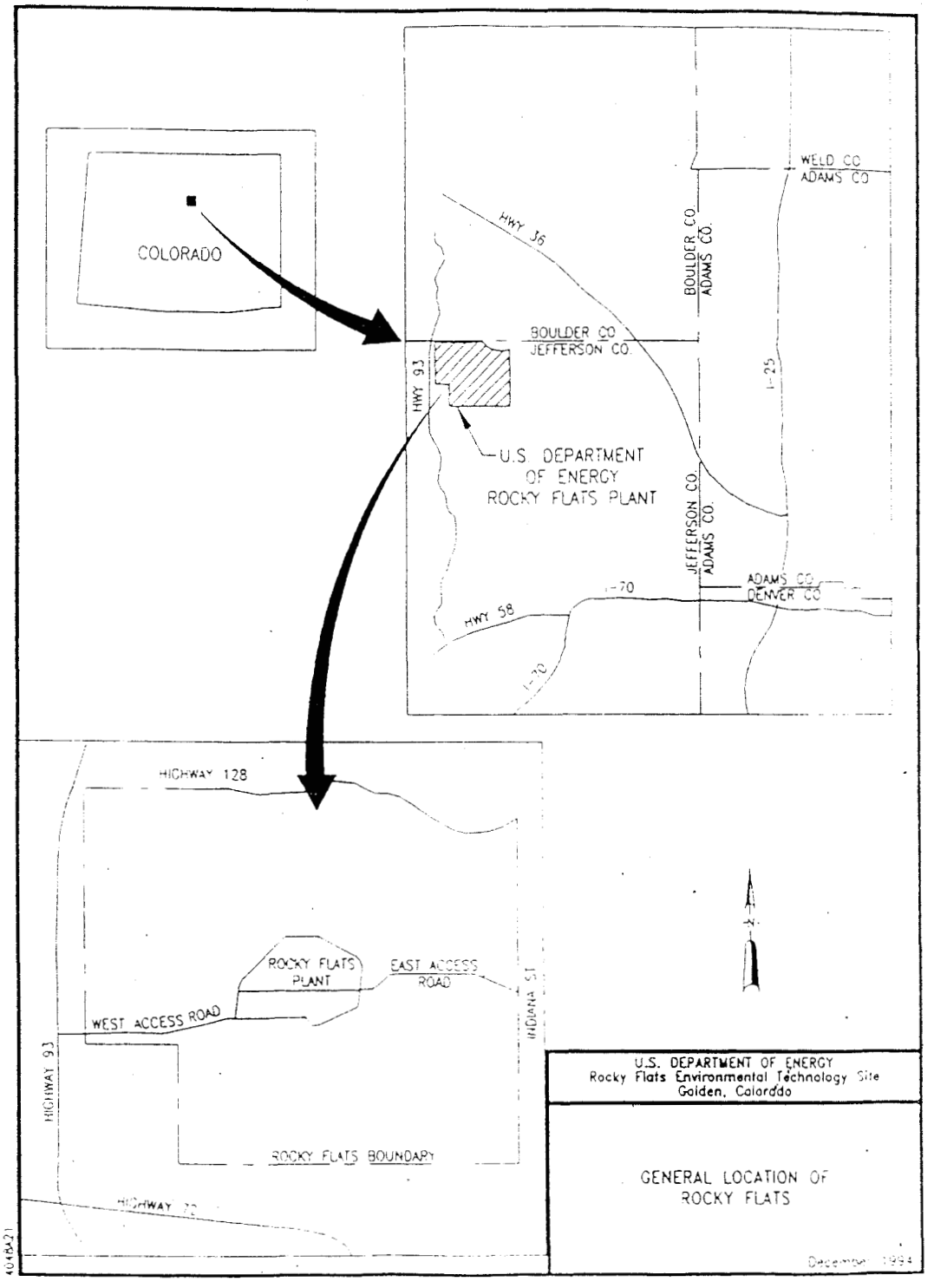
2.0 SITE HISTORY AND NATURE OF CONTAMINATION

2.1 ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE

2.1.1 Physical Setting

RFETS is located in northern Jefferson County, Colorado, approximately 16 miles northwest of Denver. The cities of Boulder, Broomfield, Westminster, and Arvada are located less than 10 miles to the north, northeast, east, and southeast, respectively. RFETS consists of approximately 6,550 acres of federal land and occupies Sections 1 through 4 and 9 through 15 of Township 2 South, Range 70 West, 6th Principal Meridian. Major plant buildings are located within an RFETS security area of approximately 400 acres. The security area is surrounded by a buffer zone of approximately 6,150 acres. RFETS is generally bounded on the north by State Highway 128. To the east is Jefferson County Highway 17, also known as Indiana Street; to the south are agricultural and industrial properties, and State Highway 72; and to the west is State Highway 93. A map of the site is illustrated in Figure 2.1.

Figure 2.1 RFETS Site Location Map



2.1.2 Site Background

RFETS is a government-owned and contractor-operated facility that is part of the nationwide nuclear weapons production complex. It was operated for the U. S. Atomic Energy Commission (AEC) from RFETS's inception in 1951 until the AEC was dissolved in January 1975. Then, responsibility for RFETS was assigned to the Energy Research and Development Administration (ERDA), which was succeeded by the Department of Energy (DOE) in 1977. Dow Chemical USA, an operating unit of the Dow Chemical Company, was the managing and operating contractor of the facility from 1951 until June 30, 1975. Rockwell International succeeded Dow Chemical USA from July 1, 1975 to January 1, 1990. EG&G Rocky Flats, Inc. succeeded Rockwell International and operated the plant from January 1, 1990 to July 1, 1995. The plant has been operated by Kaiser-Hill, LLC. since July 1, 1995.

2.1.3 Rocky Flats Plant Operations

Until 1992, Rocky Flats' primary mission was to produce metal components for nuclear weapons. These components were fabricated from plutonium, uranium, and nonradioactive metals, principally beryllium and stainless steel. Parts made at the plant were shipped elsewhere for final assembly. When a nuclear weapon is determined to be obsolete, components of these weapons that had been fabricated at RFETS are returned for special processing to recover plutonium. Other activities at RFETS include research and development in metallurgy, machining, nondestructive testing, coatings, remote engineering, chemistry, and physics.

2.1.4 Previous Investigations

Various studies have been conducted at RFETS to characterize environmental media and to assess the extent of radiological and chemical contaminant releases to the environment. These have included geological studies, surface water and groundwater studies, and geophysical and radiometric surveys. Several environmental, ecological, and public health studies culminated in the Final Sitewide Environmental Impact Statement (DOE 1980).

In 1986, two major environmental investigations were completed at RFETS. The first was the Comprehensive Environmental Assessment and Response Program (CEARP) Installation Assessment (DOE 1986a), which included analyses and identification of current operational activities, active and inactive waste sites, current and past waste management practices, and potential environmental pathways through which contaminants could be transported.

Several sites that could potentially have adverse impacts on the environment were identified. These sites were divided into three categories:

- Hazardous waste management units that will continue to operate and need a Resource Conservation and Recovery Act (RCRA) Part A operating permit
- Hazardous waste management units that will be closed under RCRA interim status
- Inactive waste management units that will be investigated and cleaned up under Section 3004 (u) of RCRA or under CERCLA

The second major environmental investigation completed at RFETS in 1986 involved a hydrogeologic and hydrochemical characterization of the entire RFETS site. Results of these investigations were reported by Rockwell International in 1986. Investigation results indicated four areas to be significant contributors to environmental contamination, with each area containing several sites. Those areas are commonly referred to as the 881 Hillside Area, the 903 Pad Area, the Mound Area, and the East Trenches Area.

2.2 CREATION OF THE OPERABLE UNITS AND INDIVIDUAL HAZARDOUS SUBSTANCE SITES

The Draft Installation Assessment under the Comprehensive Environmental Restoration Program (CERP), formerly the Comprehensive Environmental Assessment and Response Program (CEARP) (DOE 1986a), appears to have been the first document to compile a list of potential hazardous waste sites at RFETS. The Assessment also attempted to prioritize the sites on the basis of the EPA's Hazard Ranking System (HRS) and DOE's Modified HRS scoring. High priority sites, such as the 881 Hillside, were recommended for further investigation and remedial investigations commenced at the high priority sites. The RCRA Part B Permit Application (DOE 1986b, DOE 1986c) for the RFETS was completed in November 1986 for RFETS hazardous waste management units that would continue to operate. Appendix 1 of the permit application (DOE 1987), RCRA 3004 (u) Waste Management Units, defined the inactive waste sites as solid waste management units (SWMUs). A plan for investigating the remaining sites, referred to as the low priority sites, was prepared in 1988. This plan identified 103 low priority SWMUs and recommended appropriate additional investigations. The plan also presented groups of SWMUs based on their geographical locations, similar contaminants, and applicable pathways. The SWMUs were combined into ten Operable Units (OU's) in the Draft Interagency Agreement (IAG 1990).

Additional SWMUs were added to the IAG based on the Part B RCRA application and independent reviews of aerial photographs and facility submittals. A total of 178 SWMUs were identified. The ten OU's were reprioritized and divided into sixteen OU's (Operable Units 1 through 16) in the final IAG (1991). Since 1991, OU's 11, 15, and 16 have been closed and no further action is planned. The SWMU's were also renamed Individual Hazardous Substances Sites (IHSS's) in the final IAG. The term IHSS is used in the remainder of this Section.

2.2.1 Operable Unit 1 - 881 Hillside

Information on the nature and extent of contamination is taken from the Final Phase III RFI/RI Work Plan, Rocky Flats Plant, 881 Hillside Area Operable Unit No. 1 (DOE 1990). Section 2.3.1 of that Work Plan describes how background levels of chemical constituents were calculated. Section 2.3 and the Appendixes of that Work Plan present available analytical data.

Phase I and Phase II soils investigations indicated tetrachloroethane, trichloroethane, and 1,1,1-trichloroethane contamination in some samples at the 881 Hillside. Plutonium and americium were detected above background in soil samples that include the ground surface; however, windblown dust from the 903 Pad (OU2) is the suspected source of these radionuclides. Tetrachloroethane and trichloroethane are the principal volatile organic compounds which have been detected in surface water samples in the area. Numerous metals and other inorganic compounds have occasionally been above background. Gross alpha, gross beta, uranium, and plutonium levels exceed background in many of the surface water samples.

Groundwater is contaminated in both the eastern and western portion of the 881 Hillside. The most pronounced organic contamination is in the eastern portion of the Hillside area, with tetrachloroethane, trichloroethane, 1,1-dichloroethene, 1,1-dichloroethane, 1,1,1-trichloroethane, 1,1,2-trichloroethane, and carbon tetrachloride reaching several thousand micrograms per liter in many samples. Organic contamination in the western portion of the 881 Hillside area occurs at much lower concentrations. Concentrations of metals and inorganic constituents in the eastern portion of the study area include numerous occurrences of nickel, strontium, selenium, zinc, copper, and uranium above background.

2.2.2 Operable Unit 2 - 903 Pad, Mound, and East Trenches

Information on the nature and extent of contamination is taken from the Phase II RFI/RI Work Plans for Alluvial and Bedrock, 903 Pad, Mound, and East Trenches Areas (Operable Unit 2) (DOE 1991a, DOE 1991b). Section 2.3 of the Work Plan describes how background levels of chemical constituents were calculated. Section 2.3 and the Appendixes of the Work Plan present available analytical data.

Plutonium, uranium, and americium occur above background in surface soils. Other radionuclides and trace metals occur at low concentrations and are infrequently above background but may also be soil contaminants. Data suggest plutonium, uranium, and americium were released to soils in the area via wind dissemination during clean-up efforts at the 903 Drum Storage Site.

Based on existing results, carbon tetrachloride, tetrachloroethane, and trichloroethane are the primary volatile organic contaminants found in the upper hydrostratigraphic unit groundwater flow system. Trace elements commonly occurring above background in groundwater include strontium, barium, copper, and nickel, and to a lesser extent, chromium, manganese, selenium, lead, zinc, and molybdenum. Also, major cations and anions and total dissolved solids are somewhat elevated above background throughout and downgradient of the OU. Uranium-238 is the predominant radionuclide occurring above background in the upper groundwater, but a few samples indicate plutonium and americium downgradient of the 903 Pad and possibly north of the Mound.

There is considerable interaction between surface water and groundwater. As a result, organic contamination is observed in seeps downgradient of the 903 Pad and in the upper reaches of South Walnut Creek at the Mound Area. Also, somewhat elevated concentrations of total dissolved solids, major ions, strontium, zinc, and uranium are present at many of the surface water stations. Plutonium and americium are also observed in two seeps downgradient of the 903 Pad and in the upper reaches of South Walnut Creek. This may be attributed to the water from the seeps coming in contact with surface soils exhibiting elevated concentrations of these radionuclides.

2.2.3 Operable Unit 3 - Off Site Releases

Information on the nature and extent of contamination is taken from Final RFI/RI Work Plan for Operable Unit 3, Rocky Flats Plant (DOE 1991c). IHSS 199, Contamination of the Land's Surface, is comprised of 350 acres of

land with concentrations of plutonium greater than 0.9 picocuries per gram. Hot spots may occur outside the designated acreage; however, it is reasonable to assume that areas outside the designated acreage contain lower concentrations of plutonium than the designated areas. Remediation has been implemented on 120 of the 250 acres of contaminated land owned by Jefferson County. Tilling of the 120 acres resulted in soil concentrations below the mandated cleanup level. Revegetation of this land is in progress. Very few data exist for contaminants other than plutonium.

Sampling at Great Western Reservoir (IHSS 200) indicates that layers of sediment containing plutonium above background levels are present in the bottom of the reservoir. Plutonium exists in discrete sediment horizons (at depths of 17 inches and 7.5 inches) corresponding to historical releases from RFETS. The highest concentrations are found in the deepest areas of the reservoir. There is no evidence of plutonium migration through the sediment column. Concentrations of plutonium and other radionuclides in water at the reservoir are below background levels and/or EPA drinking water standards.

Radioactive materials released from RFETS may have been transported to Standley Lake (IHSS 201) through surface water and/or airborne particulates. Plutonium has been measured in sediment in the lake. The concentrations in the sediment layers exceeded baseline levels beginning in the 1966 layer, peaked in 1969, and declined after 1969. The time period correlates with the known period of windblown plutonium release from the 903 Pad at RFETS. Studies of the sediments concluded that plutonium rapidly and almost irreversibly attaches itself to clay sediments. In 1974, Battelle conducted an investigation of radionuclide concentrations in reservoirs and streams near RFETS. Concentrations of plutonium-239, plutonium-240, and americium-241 in the water at the lake were above the expected atmospheric fallout background, which was not specifically quantified in the study, but were more than four orders of magnitude below EPA National Primary Drinking Water Regulation of 15 pCi/L for total long-lived alpha activity.

Only very limited data have been collected to characterize Mower Reservoir (IHSS 202). RFETS derived contaminants in the reservoir are believed to have been transported primarily as airborne particulates, and, to a lesser degree, by surface water through the Woman Creek drainage. It can be inferred that contaminant concentrations resulting from releases into Woman Creek would be similar for Mower Reservoir and Standley Lake, while concentrations resulting from airborne releases and from erosion and transport of contaminated soils by surface runoff would be similar for Mower Reservoir and Great Western Reservoir. It is expected that Mower Reservoir received amounts of plutonium through airborne transport similar to the nearby land surface.

2.2.4 Operable Unit 4 - Solar Evaporation Ponds

Information on the nature and extent of contamination is taken from the Draft Final Phase I RFI/RI Work Plan (DOE 1991d) and Environmental Assessment, Dewatering and RCRA Partial Closure Action on Solar Evaporation Ponds, Rocky Flats Plant (DOE 1991f). Section 2.5 of the Work Plan describes the calculation of background concentration and summarizes the chemical data for OU4.

Liquids and sludges in the Solar Evaporation Ponds contain detectable levels of the radionuclides plutonium, americium, tritium and uranium. Metals of concern in the liquids and sludges include beryllium, cadmium, chromium and nickel. Nitrates are also a major constituent of the liquids and sludges. Soil samples in the vicinity of the solar ponds contain concentrations of chromium, nickel, nitrate, potassium, sodium, calcium, magnesium, and radionuclides that are likely attributable to the Solar Ponds. Low levels of nitrates and radionuclides have been detected in both alluvial and bedrock groundwater. Surface water in the form of seeps near the solar ponds contains nitrate, metal and radionuclides.

2.2.5 Operable Unit 5 - Woman Creek Priority Drainage

Information on the nature and extent of contamination is taken from Section 2.0 of the Final Phase I RFI/RI Work Plan, Woman Creek Priority Drainage (Operable Unit No. 5) (DOE 1991g).

The Original Landfill (IHSS 115) received numerous materials during its operation. Chemicals that may have been placed in the Original Landfill include commonly used solvents, such as trichloroethylene, carbon tetrachloride, tetrachloroethylene, petroleum distillates, 1,1,1-trichloroethane, dichloromethane, benzene, paint and paint thinners. Metals such as beryllium, uranium, lead, and chromium may also be present. Radiological surveys of the area have indicated the presence of radionuclides, and some soil containing uranium was previously removed from the Original Landfill. Metals and radionuclides have been detected in groundwater near the Original Landfill.

The nature and extent of contamination at the Ash Pits, Incinerator and Concrete Wash Pad (IHSS's 133.1 through 133.6) are not well known. General combustible wastes from RFETS were burned in the incinerator along with an estimated 100 grams of depleted uranium. Metals were detected in Ash Pit 3. Metals and radionuclides have been detected in groundwater wells near the Ash Pits.

Detention ponds C-1 and C-2 have been regularly sampled in recent years. Water in the ponds is known to contain detectable concentrations of metals and radionuclides, but background levels have not been determined for the Woman Creek area. Sediment samples also contain measurable metals and radionuclides.

2.2.6 Operable Unit 6 - Walnut Creek Priority Drainage

Information on the nature and extent of contamination is taken from Section 2.0 of the Final Phase I RFI/RI Work Plan, Walnut Creek Priority Drainage (Operable Unit No. 6) (DOE 1991h).

Ponds A-1 and A-2 contain radionuclides including plutonium and uranium in both the water and the sediments. Pond A-3 is reported to contain elevated uranium-233/234 and uranium-238 concentrations like Pond A-2. Water quality in Pond A-4 is similar to background levels. Pond B-1 has moderately elevated uranium-233/234 and uranium-238 concentrations, and plutonium is reported in both the water and the sediments. Pond B-2 water contains background levels for the various radionuclides except plutonium. Pond B-3 has detectable plutonium as well as zinc and nitrates. Ponds B-4 and B-5 have detectable levels of uranium-233/234 and 238. Ground water in the vicinity of the A- and B-series ponds contain several metals and radionuclides above detection limits but these concentrations could represent background levels.

No previous studies have been conducted at the four spray fields. However, analytical results from water samples collected from the East and West Landfill Ponds provide significant data regarding the North, South and Pond Area Spray Fields (IHSS's 167.1-3). Strontium and tritium were detected in the Landfill Ponds water. In addition, minor organics and several metals and radionuclides have been reported in surface water and groundwater samples collected near the spray fields. Analytical data from Pond B-3 water provides data regarding the East Area Spray Field (IHSS 216.1). Radionuclides and metals have been detected in the water from Pond B-3.

Only one previous soils investigation has reportedly been conducted at Trench A. Uranium-233/234 and 238, and several volatile organics were detected in the soils. Metals, radionuclides and one volatile organic compound have been detected in groundwater in the vicinity of the trenches. No previous studies have been conducted at the Sludge Dispersal Area (IHSS 141). A potential for contamination within the drying beds by a variety of chemicals in the sludge, particularly plutonium, is possible. Volatile organics, metals, and radionuclides have been detected in groundwater and surface water samples downgradient of the IHSS.

At the Triangle Area (IHSS 165), previous radiometric soil surveys have indicated the presence of radionuclides. The contaminated soils were removed on several occasions following the soil surveys. Metals, radionuclides and organic compounds have been detected in groundwater near the area.

Previous soils investigations at the Old Outfall (IHSS 143) reported elevated levels of plutonium and organics. Contaminated soils were removed from the site in 1971. Metals and radionuclides have been detected in surface water samples taken downgradient of the IHSS.

No previous investigations have been completed at the Soil Dump Area. The soils may contain plutonium.

2.2.7 Operable Unit 7 - Landfill and Inactive Hazardous Waste Storage Area

Since little direct characterization of the types of contaminants in the landfill or inactive storage area has been conducted to date, most of what is known is based on waste stream identification studies and groundwater and surface water quality monitoring (DOE 1991i). Previous evaluations of groundwater quality from wells at the periphery of the landfill indicate the landfill contributes calcium, bicarbonate alkalinity, and to a lesser extent, sulfate, iron, manganese, zinc, and strontium to the groundwater. Volatile contamination, primarily trichloroethylene and 1,1,1-trichloroethane, has been found sporadically and at low concentrations in groundwater in some areas at the landfill periphery. Elevated uranium and tritium levels also exist in some areas. Soil contamination has not been characterized, but it may be reasonable to assume that the nature of contamination is similar to the groundwater contamination.

The primary mechanism for release of contaminants from the Present Landfill into the affected media appears to be by percolation of groundwater (leachate) through the wastes and then out of the landfill. Groundwater flow exiting the wastes can potentially distribute contamination vertically downward and laterally downgradient. In the case of the Inactive Hazardous Waste Storage Area, any spilled material could be released by percolation into the landfill wastes.

2.2.8 Operable Unit 8 - 700 Area

Since previous investigations have not been conducted at these units, the nature and extent of contamination is based on materials stored at the sites and on previous site uses. (Rockwell International 1988, DOE 1987, DOE 1992a, DOE 1992c).

Materials stored in the tanks involved in the Multiple Solvent Spills (IHSS's 118.1 and 188.2) included carbon tetrachloride, petroleum distillates, paint thinners, 1,1,1-trichloroethane and methyl ethyl ketone. Process wastes, typically containing uranium, solvents, oils, beryllium, nitric acid, hydrochloric acid, and fluoride, were released from Valve Vault 7 (IHSS 123.1). Cooling Tower Blowdown from IHSS's 135, 137, and 138 typically contained algicides and chromates. The 1976 spill from IHSS 138 also contained some radioactivity. The 1990 spill from IHSS 138 contained phosphates. Materials stored in the tanks involved in the Caustic/Acid Spills (IHSS's 139.1 and 139.2) included hydrochloric, hydrofluoric, nitric and sulfuric acids, and sodium hydroxide and potassium hydroxide. Spills of #2 fuel oil were the cause of IHSS 151, Fuel Oil Leak. A spill of a mixture of nitric and hydrochloric acid was the cause of the Acid Leak (IHSS 188).

The Sewer Line Break (IHSS 144) involved the release of radioactive laundry wastewater. The radioactive Liquid Leaks (IHSS 150.1-8) were primarily releases of liquid process wastes containing radioactive compounds and solutions containing caustics and acids.

The Radioactive Sites - 700 Area (IHSS 163.1 and 163.2) and Radioactive Sites - 900 Area (IHSS 173) may have been contaminated with radioactive compounds including americium. No radioactivity above background levels has been detected by radiometric surveys of the IHSS 163 locations. Radioactivity has been measured at IHSS 173. Radiometric surveys have not detected radioactivity above background levels at the Building 991 Steam Cleaning Area (IHSS 184). The Central Avenue Waste spill (IHSS 172) consisted of less than 100 gallons of plutonium contaminated oils and oils with lathe coolant (hydraulic oil and carbon tetrachloride).

2.2.9 Operable Unit 9 - Original Process Waste Lines

Information on the nature and extent of contamination is taken from Draft Final Phase I RFI/RI Work Plan, Original Process Waste Lines (OPWL), Operable Unit No. 9, (DOE 1991j).

Low-level radioactive aqueous wastes with high nitrate concentrations were a primary OPWL waste stream. Volatile and semivolatile organics were transferred through the OPWL in small quantities. Numerous acids were discharged to the OPWL, as well as bases, metals, and small quantities of other liquids, including pickling liquor from foundry operations, medical decontamination fluids, miscellaneous laboratory wastes, and laundry effluent. Releases from the OPWL and associated IHSS's may have occurred as a result of leakage, deterioration of pipes, breakage, and overflows. The lateral and vertical extent of releases are not precisely known but are expected to be largely confined to the pipeline trench backfill materials and adjacent soils.

2.2.10 Operable Unit 10 - Other Outside Closures

Information on the nature and extent of contamination is taken from Draft Final Phase I RFI/RI Work Plan, Rocky Flats Plant, Other Outside Closures (Operable Unit No. 10) (DOE 1991k).

Analytical results for soil samples taken in the vicinity of the Oil Leak (IHSS 129) indicate the presence of organics including 1,1,1-trichloroethane, methylene chloride, benzene, toluene, ethylbenzene, 2-butanone, and total xylenes, and metals including mercury, cadmium, copper, and lead. Radionuclides were not tested. Groundwater data are not available for this site.

No previous investigations have been performed at the PU&D Storage Yard (IHSS 170) so the nature and extent of contamination is unknown. Soil sampling has been conducted at the Waste Spills (IHSS 174). Soils contain concentrations of volatile organics, metals, nitrates, and radionuclides above background levels. Acetone, methylene chloride and nitrate/nitrite were detected in a groundwater sample from a well northeast of IHSS's 170 and 174.

Soil samples were collected in the S&W Building 980 Container Storage Facility (IHSS 175) area in 1988. Volatile organics, metals, nitrate, and radionuclides were detected above background levels in the samples. No groundwater data are available.

Analysis of soil samples taken from borings in the S&W Contractor Storage Yard (IHSS 176) indicate levels of volatile organics, metals, nitrate, and radionuclides above background concentrations. Groundwater data from an upgradient well indicate the presence of metals, other inorganics, and radionuclides above background levels.

Potential contaminants at IHSS 207, Former Building 444 Acid Dumpsters, are cadmium, chromium, lead, silver, and radionuclides. No previous soil or water sampling investigations have been performed at the IHSS.

No previous investigations have been conducted at the Inactive 444/447 Waste Storage Area (IHSS 208) or Unit 16, Building 980 Cargo Container (IHSS 210). Therefore, no information is available concerning the nature and extent of contamination.

Analysis of soil samples taken in the area of the Unit 15, 904 Pad Pondcrete Storage Area (IHSS 213) indicated levels above background for gross alpha, gross beta, total plutonium, total uranium, uranium-234, uranium-238, americium-241, and plutonium-239. In addition, analysis of surface water samples taken in the area of IHSS 213 indicates levels above background for nitrate, cyanide, and cadmium. Further data are needed to assess groundwater contamination.

Soil samples taken from the Unit 25, 750 Pad Pondcrete and Saltcrete Storage Area (IHSS 214) indicate levels above background for gross alpha and gross beta. Surface water samples have levels above background for nitrate, cyanide, and cadmium. Further data are needed to assess groundwater contamination.

2.2.11 Operable Unit 12 - 400/800 Area

Since previous investigations have not been conducted at these units, the nature and extent of contamination is based on materials stored at the sites and previous site uses (Rockwell International 1988, DOE 1992a).

Releases of radionuclides from buildings adjacent to the Multiple Solvent Sites (IHSS's 116.1 and 116.2) may have resulted in soil contamination at these sites. Since the actual contents of the drums stored on the loading docks are unknown, it is assumed that volatile organic compounds may have been stored and may have leaked in the dock areas.

At the Building 664 Fiberglassing Areas (IHSS's 120.1 and 120.2), the chemicals of interest are believed to be

polyester resins (styrene monomer) and cleaning solvents. Also, an area of significantly high radiation was measured directly west and overlapping the site.

The potential contaminant at the Cooling Tower Ponds (IHSS's 136.1 and 136.2) is chromium. Blowdown discharged to the ponds contained chromium and algicides. Uranium may also be buried at the pond sites.

The Process Waste Leaks (IHSS 147.2) area may have been contaminated by infiltration of water that contacted equipment stored at the site. The Radioactive Site South Area (IHSS 157.2) may be contaminated by uranium, beryllium and solvents. Plutonium may also be present. Contamination is not expected at the Acid Leak sites (IHSS 187) or the Multiple Acid Spills (IHSS 189) since the acid was likely neutralized in the soil.

2.2.12 Operable Unit 13 - 100 Area

Since previous investigations have not been conducted at these units, the nature and extent of contamination is based on materials stored at the sites and previous site uses (Rockwell International 1988, DOE 1992a).

The Chemical Storage Sites (IHSS 117.1-3) were used for storage of acids, organic solvents, soaps, and oils. These materials are presumed to be the potential contaminants at these IHSS's.

The Oil Burn Pit No. 1 Waste Leak (IHSS 128) is a pit area that contains approximately 70 cubic feet of depleted uranium. The Lithium Metal Destruction Site (IHSS 134) may contain residues of lithium and small amounts of sodium, calcium, and magnesium. The lithium has possibly reacted with the soil to form lithium carbonate. Radionuclides may have been spilled at the Waste Spill (IHSS 148) site, although radioactive surveys of the area have found radioactivity levels consistent with background levels.

Fuel oil is the potential contaminant at the Fuel Oil Tank Spill (IHSS 152). The Radioactive Site South Area (IHSS 157.1) may be contaminated by uranium, beryllium and solvents. Plutonium may also be present. The Radioactive Site - Building 551 (IHSS 158) is suspected of being contaminated with uranium. The Waste Drum Peroxide Burial (IHSS 169) may still contain peroxide, which can be an explosion hazard. The site is not considered to be a chemical hazard. Residues of the burning of waste solvents are the concern at the Solvent Burning Ground (IHSS 171).

Radioactive process waste may have contaminated the Valve Vault 12 (IHSS 186) area. Sodium hydroxide is the potential contaminant at IHSS 190. However, it is likely that any sodium hydroxide remaining in the environment would have been neutralized by the buffering action of the soil. The soil also would have buffered any remaining hydrogen peroxide from the Hydrogen Peroxide Spill (IHSS 191).

2.2.13 Operable Unit 14 - Radioactive Sites

Since previous investigations have not been conducted at these units, the nature and extent of contamination is based on materials stored at the sites and previous site uses (Rockwell International 1988, DOE 1992a).

Radioactive Site #1 - 700 Area (IHSS 131) and Radioactive Burial Site - Building 334 Parking Lot (IHSS 156.1) may have been contaminated by plutonium. Small amounts of plutonium and uranium may have remained at the Building 444 Parking Lot (IHSS 160) and Building 664 (IHSS 161); however, no radioactivity above background levels was detected during the radiometric survey of the area. The radioactive hot spots in the pavement on 8th Street may still exist as Radioactive Site #2 - 700 Area (IHSS 162). Radioactivity may also exist at the Radioactive Sites in the 800 Area (IHSS 164.1-3).

A site map showing Operable Unit locations at RFETS is included as Figure 2.2.

2.3 SCOPE OF WORK

Work at the Main and Protected Area Decontamination Facilities (MDF and PADF) primarily consists of the operation and maintenance of the individual subsystems which make up the facilities. Support activities such as water\sediment sampling, waste management, data management, training, general environmental program support, and project management are also included in the scope of work. The following is a general breakdown of the major activities involved:

- *Decontamination of Equipment* - Operation in accordance with approved procedures to remove a wide variety of contaminants and sediments from equipment. Origins of equipment vary due to project locations and the volume of water generated is dependent on the size of equipment and nature of contamination.

- *Purging of Portable Tanks* - Purging of portable tanks is conducted in accordance with approved procedures. Water volume varies due to natural precipitation (well purging and development) and the nature of current projects.

- *Water / Sediment Sampling and Analysis* - Effluent waters are sampled if required to determine whether contaminants and concentrations are within the acceptance parameters for either Building 891 or Building 374 waste water treatment facilities. Sediments are also sampled to ensure proper handling, storage, and disposal.

- *Waste Handling and Management* - Waste generated by the decontamination process will be handled safely and in accordance with applicable plant procedures. These wastes include but are not limited to: water, sediments, disposable personal protective equipment, and waste generated during general maintenance.

- *Plant Records and Reporting / Data Management* - Records of surveillances and routine observations will be retained for supervisory review and trend analysis. Data concerning chemical and radiological contaminant levels will be handled to confirm accuracy and conform with plantwide standards.

- *Training and Qualification* - Operations and management personnel shall maintain an appropriate level of qualification and take specific training as recommended by project management. Decontamination facility personnel also train other subcontractors in the proper decontamination of equipment.

- *General Environmental Program Support* - General support includes but is not limited to: conducting field decontamination at various sites around RFETS, movement of materials and equipment, and providing health and safety coverage.

The decontamination facilities are typically operated 40 hours per week but may be operated significantly longer, depending upon the amount of equipment to be decontaminated and project schedules. A subcontractor is responsible for operation and maintenance of the MDF and PADF. Section 3.0 provides a more detailed description of the MDF and PADF.

3.0 FACILITY AND SYSTEM DESCRIPTIONS

The MDF and PADF are illustrated in Figures 3.1 and 3.2 respectively. A description and breakdown of the two facilities and various systems follows.

3.1 FACILITY DESCRIPTIONS

3.1.1 Main Decontamination Facility (MDF)

The Main Decontamination Facility is located in Buildings 903A and 903B. The facility is comprised of a sheet metal canopy over the decontamination pad (Building 903A) and a prefabricated metal building (Building 903B) housing the sediment removal and storage equipment. In addition, there is a health and safety shed which contains personal protective equipment, a main control panel shed, and a steam cleaner shed. Decontamination water is collected in the Building 903A sump and then transferred into Building 903B for sediment removal, storage, and discharge into tanker trucks for transport to an on site waste water treatment facility.

3.1.2 Protected Area Decontamination Facility (PADF)

The Protected Area Decontamination Facility is in the protected area at a location designated Building 966A. The facility is comprised of a outdoor decontamination pad and an outdoor sediment removal system and water storage area. In addition, there is a health and safety shed containing personal protective equipment, and a steam cleaner shed. Decontamination water is collected in the pad sump and then transferred to the storage area via the sediment removal system. When needed, the contents of the storage tanks are transferred into tanker trucks for transport to an on site waste water treatment facility.

Figure 3.1 is an overhead drawing showing the general layout of the MDF and location of the systems located within the facility. Figure 3.2 is an overhead drawing showing the general layout of the PADF and location of the systems located within the facility. Each of these systems is discussed in Sections 3.2 and 3.3.

Figure 3.1 Main Decontamination Facility Overhead Drawing

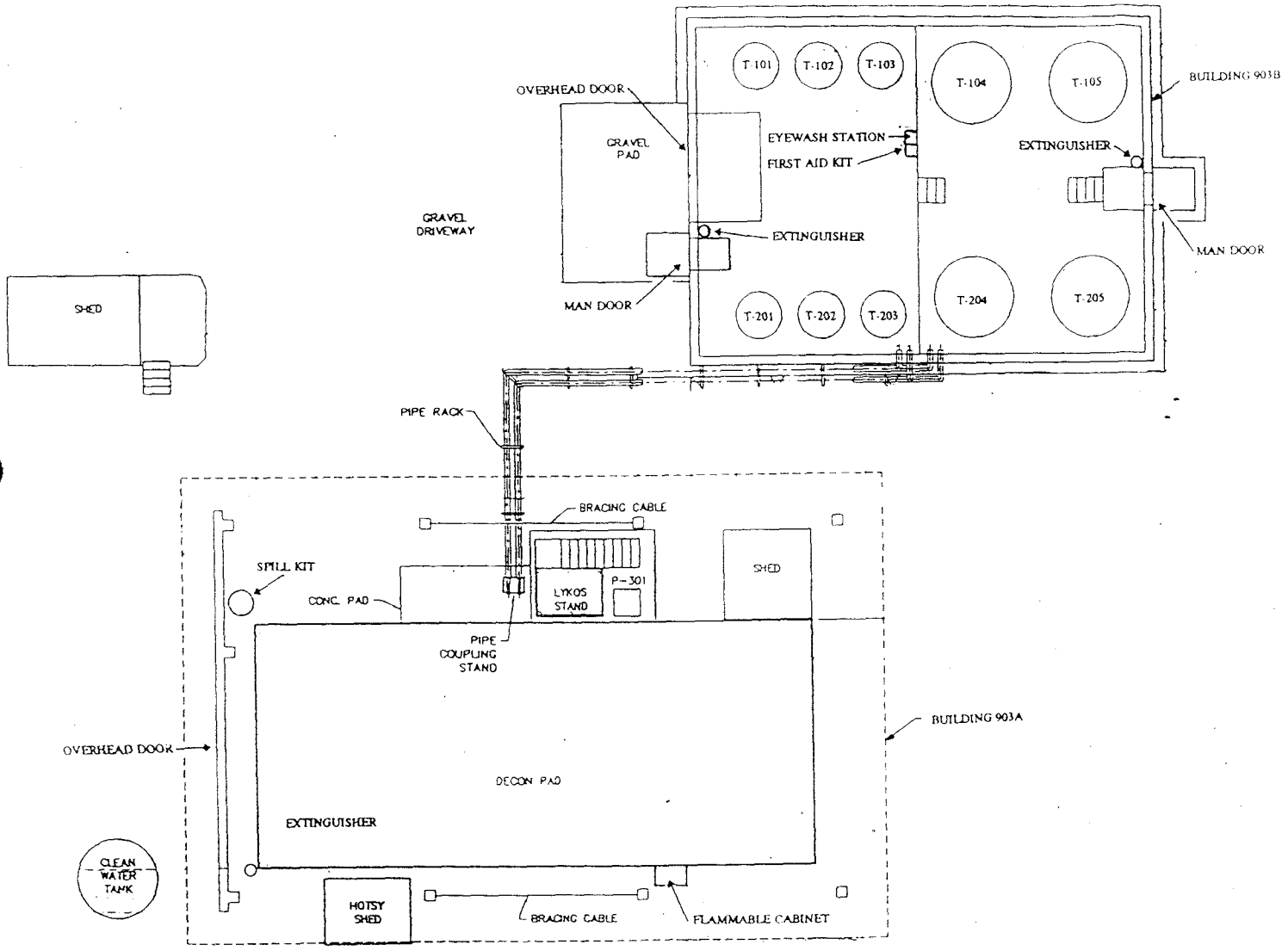
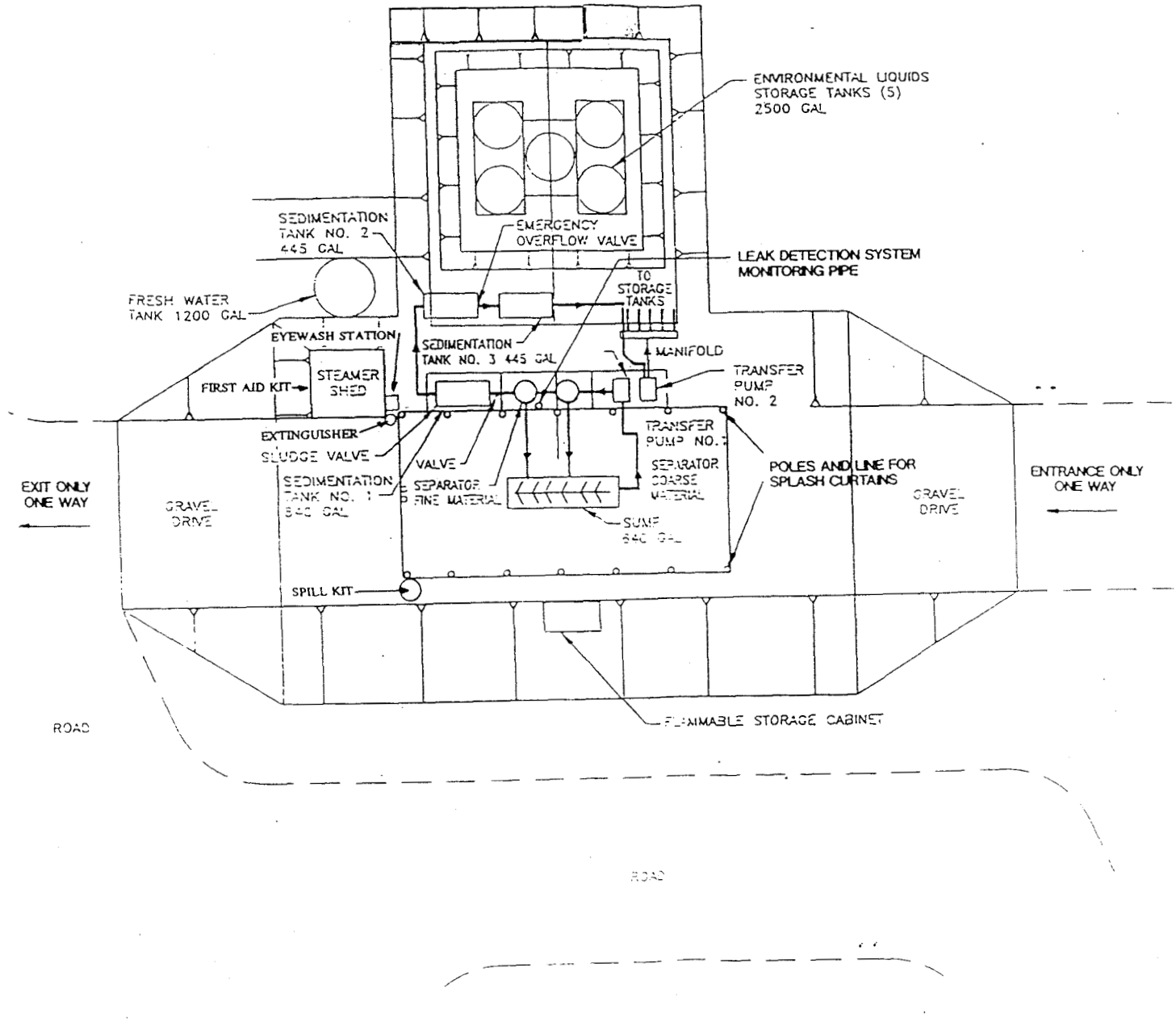


Figure 3.2 Protected Area Decontamination Facility Overhead Drawing



3.2 MAIN DECONTAMINATION FACILITY SYSTEMS DESCRIPTIONS

The MDF can be broken down into five distinct systems as follows:

- Decontamination water collection system
- Decontamination water transfer system
- Sedimentation tank liquid decant system
- Sedimentation tank solids discharge system
- Decontamination water storage and discharge system

All operations at the Main Decontamination Facility will be conducted in accordance with approved Field Operating Procedures.

A process flow diagram of the MDF can be found in Figure 3.3.

3.2.1 Decontamination Water Collection System

The decontamination water collection system consists of a 25' X 50' concrete pad with floors which slope toward a centralized 640 gallon epoxy coated floor sump. All decontamination water generated through the use of the high pressure steam cleaner or hand decontamination is collected in the floor sump via the sloping floors. The entire system is located over a secondary containment liner and leak detection is accomplished through the use of a monitoring well. When needed, the water collected in the sump is transferred into Building 903B for additional sediment removal and storage. Sump levels are determined visually.

3.2.2 Decontamination Water Transfer System

The water transfer system is a series of pumps and valves which are primarily manipulated from the main control panel located in the shed between Buildings 903A and 903B. The main control panel also displays tank levels and the status of alarms. The primary pump for transferring water into Building 903B is housed in a heater box designed to resist freezing at temperatures down to -5°F accompanied by 15 MPH winds. Numerous other pumps and valves are located in Building 903B. All decontamination water transfer lines not within a secondary containment area are double walled to prevent environmental contamination in the event of piping failure.

3.2.3 Sedimentation Tank Liquid Decant System

The sedimentation tank liquid decant system is located in Building 903B and consists of six 700 gallon cone bottomed settling tanks in two series containing three tanks each. Water is received from the decontamination pad sump and sediments are allowed to settle out in the first tank until the water level reaches the outlet port and flows into the second tank. This process is repeated until decanted water is finally transferred into the third tank. After final settling in tank three, decanted water is then transferred into one of four 4,400 gallon storage tanks. All sedimentation system tanks in each series are equipped with high level indicators to prevent overfilling.

3.20.4 Sedimentation Tank Solids Discharge System

The sedimentation tank discharge system is designed to remove sediments from the sedimentation tank liquid decant system. When the accumulated sediments in the six 700 gallon cone bottom tanks reach a level requiring removal, drums are placed beneath the settling tanks and the sediments are drained via valves installed for that purpose or the sediments are transferred back to the decontamination pad sump for manual drumming.

3.2.5 Decontamination Water Storage and Discharge System

The decontamination water storage area is made up of four 4,400 gallon holding tanks located within a secondary containment in Building 903B. All water storage tanks are equipped with high and low level indicators as well as actual level indicators. When discharge from the system is required, a series of pumps and valves transfers the effluent to the decontamination pad (Building 903A) where a flex hose is used to transfer the waste water to a tanker truck for transport to an on site waste water treatment facility.

3.3 PROTECTED AREA DECONTAMINATION FACILITY SYSTEMS DESCRIPTIONS

The PADF can be broken down into five distinct systems as follows:

- Decontamination water collection system
- Decontamination water transfer system
- Sedimentation tank liquid decant system
- Sedimentation tank solids discharge system
- Decontamination water storage and discharge system

All operations at the Protected Area Decontamination Facility will be conducted in accordance with approved Field Operating Procedures.

A process flow diagram of the PADF can be found in Figure 3.4.

3.3.1 Decontamination Water Collection System

The decontamination water collection system consists of a 25' X 50' concrete pad with floors which slope toward a centralized 640 gallon epoxy coated floor sump. All decontamination water generated through the use of the high pressure steam cleaner or hand decontamination is collected in the floor sump via the sloping floors. The entire system is located over a secondary containment liner and leak detection is accomplished through the use of a monitoring well. When needed, the water collected in the sump is transferred into sediment tank #1 for sediment removal and subsequent storage. Sump levels are determined visually.

3.3.2 Decontamination Water Transfer System

The water transfer system consists of manually operated valves and gasoline powered centrifugal pumps. All decontamination water is transferred via flexible hoses with quick couple connections.

3.3.3 Sedimentation Tank Liquid Decant System

The sedimentation tank liquid decant system is comprised of three settling tanks in series. Decontamination water

from the sump is pumped into the first tank (840 gallon capacity) where the sediments are allowed to settle out. When the level of tank #1 fills up to a discharge port, the water is gravity drained into sedimentation tank #2 which has a capacity of 445 gallons. In turn, when sedimentation tank #2 fills up the water is gravity drained into sedimentation tank #3 (445 gallon capacity). After final settling in tank #3, the water is pumped into one of five 2500 gallon storage tanks. During the pumping of sedimentation tank #3, care is taken not to disturb the sediments on the bottom of the tank.

3.3.4 Sedimentation Tank Solids Discharge System

Unlike the MDF, all sediments at the PADF must be removed by hand or with a portable, gas powered, diaphragm pump and placed into drums.

3.3.5 Decontamination Water Storage and Discharge System

The decontamination water storage area is made up of five 2,500 gallon holding tanks located within a secondary containment. When needed, the water is transferred into tanker trucks via manually operated, gasoline powered pumps for transport to an on site waste water treatment facility.

4.0 PROJECT TEAM ORGANIZATION AND RESPONSIBILITIES

The Rocky Flats oversight contractor has overall responsibility for the Health and Safety Program at the Rocky Flats Environmental Technology Site. The subcontractor is specifically responsible for the Health and Safety Plan for the operation and maintenance of the MDF and PADF. The project Health and Safety Organization is shown in Figure 4.1. Project personnel and the major responsibilities for key personnel are summarized in Tables 4.1 and 4.2.

Figure 4.1 Project Organization

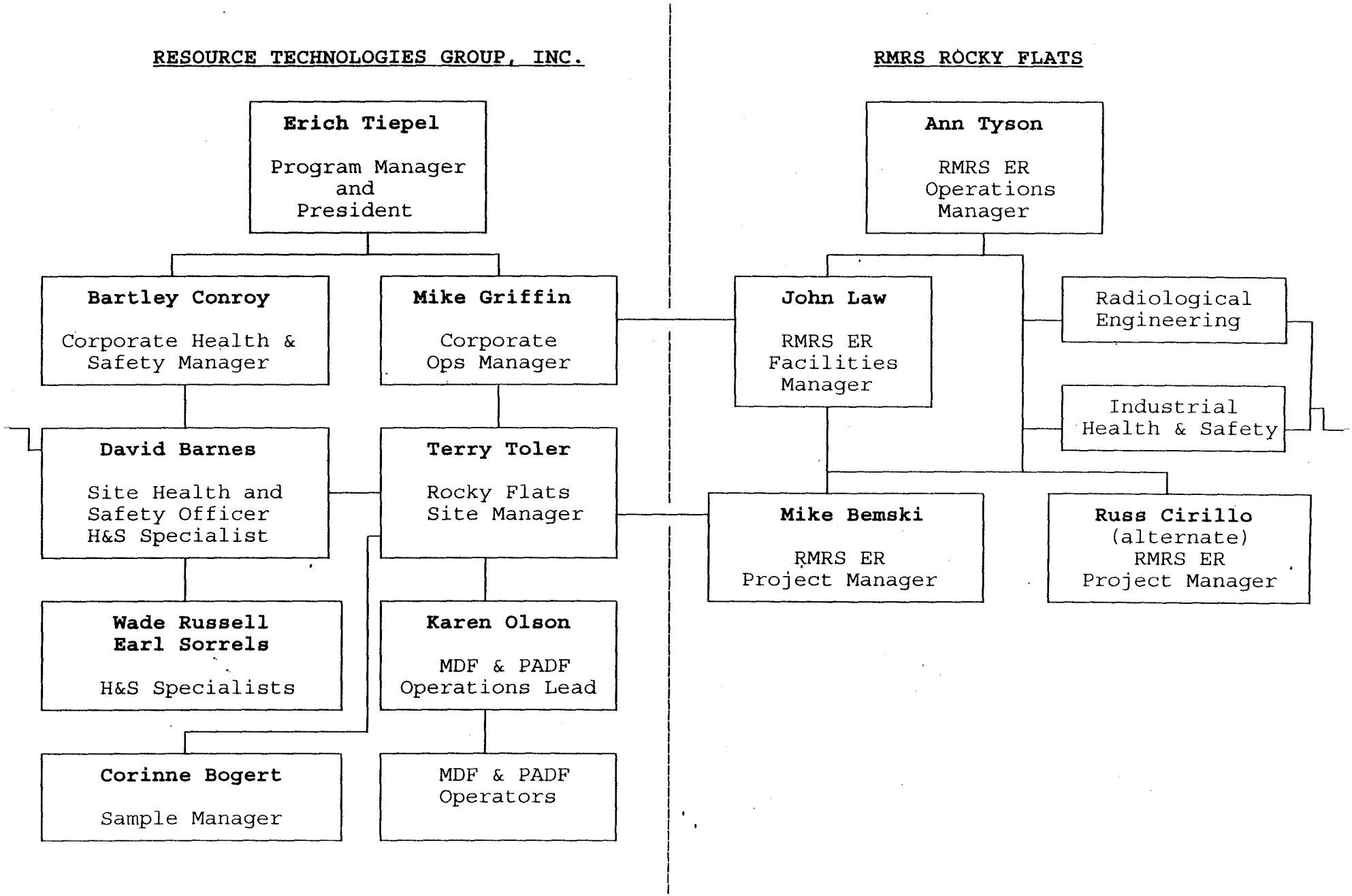


Table 4.1 Project Personnel

COMPANY	NAME AND FUNCTION	EXTENSION	PAGER (966-4000)
RMRS	**Mike Bemski** Contractor's Technical Representative Project Manager	966-4090	7466
RMRS	**Russ Cirillo** Project Manager	966-5876	4011
RMRS	**Peggy Schreckengast** ER Health and Safety	966-6790	3059
SSOC	**Scott Newsom** ER Radiological Engineer	966-8148	3529
RTG	**Erich Tiepel** Program Manager	969-8511	
RTG	**Bartley Conroy** Corporate Health and Safety Officer	969-8511	
RTG	**Terry Toler** Site Manager	966-6377	448-2909
RTG	**David Barnes** Site Safety Officer	966-5352	3542

Table 4.2 Subcontractor Personnel Responsibilities

Title	General Description	Responsibilities
Site Manager	Has authority to direct response operations. Assumes total control over site activities. Stop work authority.	• Prepares and organizes the background review of the situation, Work Plan, the Project Health and Safety Plan, and the field team. • Ensures that the Work Plan is completed and on schedule. • Oversees the Project Health and Safety Officer to ensure that safety and health requirements are met. • Prepares the final report and support files on the project activities.
Project Site Safety Officer	Advises the Project Manager on all aspects of health and safety on site. Stops work if any operation threatens worker or public health or safety.	• Periodically inspects PPE and equipment. • Ensures that protective clothing and equipment are properly stored and maintained. • Implements the health and safety plan. • Conducts periodic inspections to determine if the Project Health and Safety Plan is being followed. • Knows emergency procedures, evacuation routes, and the telephone numbers for emergency response.

Table 4.2 (Continued)

Subcontractor Personnel Responsibilities

Title	General Description	Responsibilities
Project Site Safety Officer (continued)		• Sets up decontamination lines and the decontamination solutions appropriate for the type of chemical contamination on site. • Controls the decontamination of all equipment, personnel, and samples from the contaminated areas. • Assures proper disposal of contaminated clothing and materials. • Ensures that all required health and safety equipment is available. • Notifies RMRS personnel by telephone or radio in the event of a emergency.
Subcontractor Health and Safety Manager		• Develops Health and Safety Guidelines. • Reviews Project Health & Safety Plans. • Develops site-specific Health & Safety procedures with Project Site Safety Officer. • Conducts inspections, reviews compliance and reviews health & safety records.

Table 4.2 (Continued)

Subcontractor Personnel Responsibilities

Title	General Description	Responsibilities
Health and Safety Specialists	Provides support of operations involving radiological monitoring	• Performs routine monitoring of lab and PPE waste materials in accordance with applicable RFETS procedures to ensure control of radiological contaminants. • Performs routine monitoring of sample shipment containers in accordance with RMRS procedures to ensure control of radiological contaminants. • Performs special monitoring for radiological contaminants as required in accordance with RMRS procedures. • Conducts air monitoring, as required.
Pad Operator	Provides daily operations and maintenance of the facility.	• Follows standard operating procedures. Verifies that the plant is operating in a safe manner and complies with RFETS procedures and management specified regulations. • Stop work authority. • Maintains daily records of all activities. • Advises Project Health and Safety Officer of any unusual events.

5.0 HEALTH AND SAFETY RISK ANALYSIS

The hazards associated with the operation of the MDF and PADF include hazardous substances (chemical and radiological); physical hazards; thermal hazards; biological hazards; and possible construction hazards.

5.1 HAZARDOUS SUBSTANCES

Potentially contaminated waste water and sediments collected at the MDF and PADF may contain numerous hazardous substances. This Section identifies and addresses potential chemical hazards.

5.1.1 Chemical Contaminant Hazards

It would be impossible to list all potential hazardous contaminants to be found at RFETS. Chemical hazards posed by site contaminants in routine MDF and PADF decontamination waste waters are listed in Table 5.1. Non-routine decontamination waste water will be analyzed on a case by case basis.

Table 5.1 Chemical Hazards Posed by Site Contaminants and Route of Exposure

Contaminant (Synonyms) (Abbreviations)	Action Level	PEL or TLV	IDLH	Physical/ Chemical Characteristics	Routes of Exposure	First Aid	Exposure Symptoms	IP eV
Acetone	375 ppm	750 ppm	2500 ppm	Colorless liquid with a fragrant mint-like odor. Fl. pt. 0°F LEL: 2.5% UEL: 12.8% VP: 180 mm Hg (@ 68°F)	Inhalation Ingestion Contact	Artificial respiration; Seek medical attention; Irrigate and wash area affected immediately.	Eye, nose, and throat irritation; headache; dizziness; dermatitis	9.69
Carbon Disulfide (Carbon Bisulfide)	2 ppm	PEL = 4 ppm TLV = 10 ppm REL = 1 ppm	500 ppm	Colorless to faint yellow liquid; UEL: 50% LEL: 1.3%	Inhalation Ingestion Absorption Contact	Artificial respiration; Seek medical attention; Irrigate and wash area affected immediately.	Dizziness, headache, fatigue, poor sleep, nervousness, psychosis, coronary heart disease; gastritis; eye, skin burns	10.08
1,1-Dichloro-ethylene (Vinylidene chloride) (1,1-Dichlor-oethene) (1,1-DCE)	0.5 ppm	PEL = 1 ppm TLV = 5 ppm	Carcinogen	Colorless Liquid, mild sweet odor. LEL: 6.5% UEL: 15.5%	Inhalation Ingestion Absorption Contact	Artificial respiration; Seek medical attention; Irrigate and wash area affected immediately.	Liver and kidney changes.	10.00
Methylene Chloride (Dichloro-methane. Methylene Dichloride)	25 ppm	PEL = 500 ppm TLV = 50 ppm	Carcinogen (2300 ppm)	Colorless liquid with chloroform-like odor; BP: 104°F UEL: 22% LEL: 14%	Inhalation Ingestion Contact Absorption	Artificial respiration; Seek medical attention; Irrigate and wash area affected immediately.	Fatigue; weakness; sleepiness; lightheaded-ness; numb-ness and tingling in limbs; nausea; eye and skin irritation	11.32
1,1-Dichloro-ethane	50 ppm	100 ppm	3,000 ppm	Colorless, oily liquid Chloroform-like odor	Inhalation Ingestion Contact	Artificial respiration; Seek medical attention; Irrigate and wash area affected immediately.	CNS depression; liver and kidney damage; skin irritation.	11.06

Table 5.1 (Continued)

Chemical Hazards Posed by Site Contaminants and Route of Exposure

Contaminant (Synonyms) (Abbreviations)	Action Level	PEL or TLV	IDLH	Physical/ Chemical Characteristics	Routes of Exposure	First Aid	Exposure Symptoms	IP eV
1,2-Dichloro-ethene (1,2-Dichloro ethylene)	100 ppm	200 ppm	1,000 ppm	Colorless liquid with slightly acrid, chloroform-like odor. UEL: 12.8% LEL: 5.6%	Inhalation Ingestion Contact	Artificial respiration; Seek medical attention; Irrigate and wash affected area immediately.	Eye irritation; CNS depression; Respiratory system	9.65
1,1,1-Trichloro-ethane (Methyl Chloroform) (1,1,1-TCA)	175 ppm	350 ppm	700 ppm	Colorless liquid, mild sweet odor. LEL: 7.5% UEL: 12.5%	Inhalation Ingestion Contact	Artificial respiration; Seek medical attention; Irrigate and wash affected area immediately.	Eye and skin irritation; dermatitis, headache; drowsiness	11.00
Carbon Tetrachloride (Tetrachloro-methane)	1 ppm	2 ppm	Carcinogen 300 ppm	Colorless liquid, sweet odor, not combustible. VP: 91 mm Hg	Inhalation Ingestion Absorption Contact	Artificial respiration; Seek medical attention; Irrigate and wash affected area immediately.	CNS depression; nausea and vomiting; liver and kidney damage; skin irritation.	11.47
Trichloro-ethylene (Ethylene Trichloride) (TCE) (Trichloro-ethene)	25 ppm	50 ppm	Carcinogen (1,000) ppm	Colorless liquid, sweet odor. LEL: 8% UEL: 10.5%	Inhalation Ingestion Absorption Contact	Artificial respiration; Seek medical attention; Irrigate and wash affected area immediately.	Headache; vertigo; visual disturbance; vomiting; nausea; eye and skin irritation	9.45
1,1,2-Tri-chloroethane	5 ppm	10 ppm	Carcinogen (100 ppm)	Chloroform-like odor. Non-combustible	Inhalation Ingestion Absorption Contact	Artificial respiration; Seek medical attention; Irrigate and wash affected area immediately.	Carcinogen Irritate eyes, nose, throat; cramps; vomiting; diarrhea; affects sleep and appetite	11.00
Tetrachloro-ethylene (Perchloro-ethylene) (Tetrachloro-ethene) (Perchlor)	12 ppm	25 ppm	Carcinogen (150 ppm)	Colorless liquid with sweet odor. Not combustible. VP: 14 mm Hg	Inhalation Ingestion Absorption Contact	Artificial respiration; Seek medical attention; Irrigate and wash affected area immediately.	Eye, Nose, throat irritation; nausea; flush face; vertigo; headache; liver; kidney; CNS	9.32

Table 5.1 (Continued)

Chemical Hazards Posed by Site Contaminants and Route of Exposure

Contaminant (Synonyms) (Abbreviations)	Action Level	PEL or TLV	IDLH	Physical/ Chemical Characteristics	Routes of Exposure	First Aid	Exposure Symptoms	IP eV
Toluene (Methyl Benzene) (Methyl Benzol)	50 ppm	100 ppm	500 ppm	Colorless liquid with a sweet, pungent odor. UEL: 7.1% LEL: 1.1%	Inhalation Ingestion Absorption Contact	Artificial respiration; Seek medical attention; Irrigate and wash affected area immediately.	Fatigue, weakness, confusion, dizziness, headache; dilated pupils, nervousness, insomnia	8.82
Aluminum	2.5 mg/m^3 (Resp.)	15 mg/m^3 (Total) 5 mg/m^3 (Resp.)	NA	Silvery ductile metal	Inhalation Contact	NA	Pulmonary fibrosis; possibly Alzheimer	N/A
Antimony	0.25 mg/m	0.5 mg/m^3	50 mg/m^3	Silvery white metal	Inhalation Contact Ingestion	Artificial respiration; Seek medical attention; Irrigate and wash affected area;	Irritates eyes, nose, throat; cramps; vomiting; diarrhea; affects sleep and appetite	N/A
Arsenic	0.005 mg/m^3	0.010 mg/m^3	Carcinogen (5 mg/m^3)	Silver-gray or tin-white brittle solid.	Inhalation Absorption Contact Ingestion	Irrigate and wash affected area; immediate medical attention.	Nasal ulceration; GI disturbances; respiratory irritation.	N/A
Barium	0.25 mg/m^3	0.5 mg/m^3	50 mg/m^3	Silver-white, slightly lustrous	Inhalation Ingestion Contact	Artificial respiration; Seek medical attention; Irrigate and wash affected area immediately.	Irritates eyes, nose, throat, upper respiratory; GI; muscle spasm; slow pulse; skin burns	N/A
Beryllium	0.5 $\mu g/m^3$ IAW HSP 13.04 section 5.1.1	0.002 mg/m^3	Carcinogen (4 mg/m^3)	Metal: a brittle, grey-white solid; noncombus tible ; slight explosion hazard in dust or powder from	Inhalation Contact	For eye exposure, irrigate eyes immediately.	Respiratory symptoms; fatigue; weakness; weight loss.	N/A

Table 5.1 (Continued)

Chemical Hazards Posed by Site Contaminants and Route of Exposure

Contaminant (Synonyms) (Abbreviations)	Action Level	PEL or TLV	IDLH	Physical/ Chemical Characteristics	Routes of Exposure	First Aid	Exposure Symptoms	IP eV
Cadmium	0.0025 mg/m^3	0.005 mg/m^3	Carcinogen (9 mg/m^3)	Silver-white, blue tinged solid	Inhalation Ingestion	Artificial respiration; Seek medical attention.	Pulmonary edema; cough; tight chest; chills, muscle aches; nausea, vomiting; diarrhea.	N/A
Cesium	NA	NA	No Evidence	Silver-white, ductile metal or silvery liquid.	Inhalation Ingestion	Artificial respiration; Seek medical attention.	Hyper-irritability, spasms.	N/A
Chromium	0.25 mg/m^3	0.5 mg/m^3	No Evidence	Blue-white to steel-gray, lustrous solid	Inhalation Ingestion	Artificial respiration; Seek medical attention; Irrigate and wash area affected immediately.	Corrosive to skin and mucous membranes; carcinogen of the lungs, nasal cavity, stomach, larynx	N/A
Copper	0.5 mg/m^3	1 mg/m^3	100 mg/m^3	Reddish, lustrous malleable solid	Inhalation Ingestion Contact	Artificial respiration; Seek medical attention; Irrigate and wash area affected immediately.	Irritation of eyes and mucous membranes, pharynx; poison by ingestion; metal taste; damage of nervous system, kidneys, and liver	N/A
Iron	5 mg/m^3	10 mg/m^3	2500 mg/m^3	Reddish brown solid	Inhalation Ingestion	Artificial respiration; Seek medical attention	Poison by intraperi-toneal route; tissue and lung irritant; and carcinogen	N/A
Lead	0.025 mg/m^3	0.050 mg/m^3	100 mg/m^3	Bluish-gray, soft metal	Inhalation Ingestion Contact	Artificial respiration; Seek medical attention; Irrigate and wash area affected immediately.	Carcinogen of lungs and kidneys; affects CNS. GI tract, blood	N/A

Table 5.1 (Continued)

Chemical Hazards Posed by Site Contaminants and Route of Exposure

Contaminant (Synonyms) (Abbreviations)	Action Level	PEL or TLV	IDLH	Physical/ Chemical Characteristics	Routes of Exposure	First Aid	Exposure Symptoms	IP eV
Lithium	NA	NA	NA	Silver-colored light metal	Inhalation Ingestion	Artificial respiration; Seek medical attention; Irrigate and wash area affected immediately.	Reacts with body moisture to cause burns; toxic to CNS	N/A
Manganese	2.5 mg/m^3	5 mg/m^3	500 mg/m^3	Silvery or reddish gray solid; brittle; combustible	Inhalation Ingestion	Artificial respiration; seek medical attention.	Parkinson's, CNS and lung damage; sleepiness; vomit; weakness; tremors	N/A
Mercury	0.005 mg/m^3	0.01 mg/m^3	10 mg/m^3	Silvery, mobile, odorless liquid	Inhalation Ingestion Contact Absorption	Artificial respiration; Seek medical attention; Irrigate and wash area affected immediately.	Eye and skin irritant; poison by inhalation; cough; tremor; headache; irritability; GI and CNS affected	N/A
Molybdenum	7.5 mg/m^3 (Metal) 2.5 mg/m^3 (Soluble)	15 mg/m^3 (Insoluble) 5 mg/m^3 (Soluble)	5000 mg/m^3 (Insoluble) 1000 mg/m^3 (Soluble)	Dark gray or black powder with a metallic luster	Inhalation Ingestion Contact	Artificial respiration; Seek medical attention immediately.	Irritates eyes, nose and throat; diarrhea, list-lessness; liver, kidney damage.	N/A
Nickel	0.0075 mg/m^3	0.015 mg/m^3	10 mg/m^3 Carcinogen	Silvery-white, hard, malleable, and ductile metal	Inhalation Ingestion Contact	Artificial respiration; Seek medical attention; Irrigate and wash area affected immediately.	Nasal, lung and skin irritant; carcinogenic	N/A
Selenium	0.1 mg/m^3	0.2 mg/m^3	1 mg/m^3	Steel gray, nonmetallic element; combustible	Inhalation Absorption Ingestion Contact	Artificial respiration; Seek medical attention; Irrigate and wash area affected immediately.	Irritated eyes. nose, throat; GI distress; chills; headache	N/A

Table 5.1 (Continued)

Chemical Hazards Posed by Site Contaminants and Route of Exposure

Contaminant (Synonyms) (Abbreviations)	Action Level	PEL or TLV	IDLH	Physical/ Chemical Characteristics	Routes of Exposure	First Aid	Exposure Symptoms	IP eV
Silver	0.005 mg/m^3	0.01 mg/m^3	10 mg/m^3	White, lustrous solid metal.	Inhalation Ingestion Contact	Artificial respiration; Seek medical attention immediately; Flush affected area with water.	Blue-gray eyes, nasal septum, throat and skin; skin irritation, ulceration; GI distress.	N/A
Strontium	NA	NA	NA	Silvery-white metal	Ingestion Inhalation	NA	Moderately toxic by ingestion, inhalation	N/A
Thallium	0.05 mg/m^3	0.1 mg/m^3 Skin (Soluble)	15 mg/m^3	Depends upon specific compound.	Inhalation Ingestion Absorption Contact	Artificial respiration; Seek medical attention immediately; Flush affected area with water.	Nausea, diarrhea, abdominal pain, vomiting; ptosis, strabismus; tremor; chest pain, pulmonary edema; liver, kidney damage.	N/A
Vanadium	0.025 mg/m^3	0.05 mg/m^3	35 mg/m^3	Yellow-orange powder or dark gray, odorless flakes dispersed in air.	NA	NA	NA	N/A
Zinc	7.5 mg/m^3 (Total) 2.5 mg/m^3 (Resp.)	15 mg/m^3 (Total) 5 mg/m^3 (Resp.)	None Detected	White, odorless solid.	Inhalation Contact	NA	Lung and skin irritant; relatively non-toxic to humans by inhalation.	N/A

Table 5.1 (Continued)

Chemical Hazards Posed by Site Contaminants and Route of Exposure

Key:

ACGIH	-	American Conference of Governmental Industrial Hygienists
C	-	Ceiling-Concentration shall not be exceeded at any time
CNS	-	Central Nervous System
Fl. pt.	-	Flash point-closed cup, unless otherwise noted
IDLH	-	Immediately Dangerous to Life and Health-Maximum concentration from which one could escape within 30 minutes without experiencing any irreversible health effects
IP	-	Ionization potential (eV)
LEL	-	Lower Explosive Limit
mg/m^3	-	milligrams per cubic meter
N/A	-	Not applicable
NA	-	Not available
OSHA	-	Occupational Safety and Health Administration
PEL	-	Permissible Exposure Limit-Concentration is a time weighted average that must not be exceeded during any 8-hour workshift of a 40-hour workweek.
PPM	-	Parts Per Million
TLV	-	Threshold Limit Value-Concentration that nearly all workers may be repeatedly exposed, day after day, without adverse effect. (Based on an 8-hour workday and 40-hour workweek).
UEL	-	Upper Explosive Limit
$\mu g/m^3$	-	micrograms per cubic meter
VP	-	Vapor Pressure at 68°F in millimeters (mm) mercury (Hg) unless otherwise noted.

References:

Air Contaminants- Permissible Exposure Limits (29 CFR 1910.1000).

American Conference of Governmental Industrial Hygienists, Threshold Limit Values and Biological Exposure Indices for 1994 to 1995.

National Institute of Occupational Safety and Health, Pocket Guide to Chemical Hazards, June, 1994.

Sax, N. Irving, Dangerous Properties of Industrial Materials. Van Nostrand Reinhold Company, New York, 1979.

5.1.2 Process Chemical Hazards

In addition to the hazards posed by contaminants contained in the decontamination waste water and sediments, chemicals used in sample preservation pose a hazard to personnel. Table 5.2 presents a summary of the chemical hazards, routes of exposure and first aid for each sample preservation chemical used. Material Safety Data Sheets (MSDS) are contained in the facility MSDS binders, which will be maintained in conjunction with this document.

Table 5.2 Chemical Hazards Posed by Process Chemicals and Routes of Exposure

Chemical (Synonyms)	Concentration	PEL or TLV	IDLH	Physical/ Chemical Characteristics	Routes of Exposure	First Aid	Exposure Symptoms
Hydrochloric Acid	7-38% (Reagent Grade)	5 ppm (7 mg/m^3)	50 ppm	Green or yellow liquid	Inhalation Ingestion Contact	Artificial respiration; Seek medical attention; Irrigate and wash area affected immediately.	Nose and throat irritation; burns throat and eyes; cough, choking.
Nitric Acid	70%	2 ppm (5 mg/m^3) STEL 4 ppm (10 mg/m^3)	25 ppm	Colorless, yellow, or red liquid with a suffocating, acrid odor	Inhalation Ingestion Contact	Artificial respiration; Seek medical attention; Irrigate and wash area affected immediately.	Eye, nose and throat irritation; pulmonary edema; pneumonitis; bronchitis; dental erosion
Sodium Hydroxide (Caustic Soda) (Lye)	Neat (Solid)	2 mg/m^3	10 mg/m^3	White, odorless solid before mixing, disagreeable, sweet odor in solution	Inhalation Ingestion Contact	Artificial respiration; Seek medical attention; Irrigate and wash area affected immediately.	Severe skin irritation; nose irritation; temporary loss of hair
Sodium Thiosulfate	Neat (Solid)	None Established	None Established	White granules with no odor; non-flammable	Inhalation Ingestion Contact	Artificial respiration; Seek medical attention; Irrigate and wash area affected immediately.	Eye, skin, respiratory tract, and gastrointestinal tract irritation;
Sulfuric Acid	99% - (Reagent Grade)	1 mg/m^3 STEL=3 mg/m^3	15 mg/m^3	Colorless to dark brown, oily, odorless liquid; non-combustible	Inhalation Ingestion Contact	Artificial respiration; Seek medical attention; Irrigate and wash affected area immediately.	Eye, nose and throat irritation; pulmonary edema; bronchitis, emphysema

5.2 RADIOLOGICAL HAZARDS

The radiological hazards associated with operation of the Main and Protected Area Decontamination Facilities arise from alpha, beta, and gamma radiations which are emitted from the attendant radionuclides during decay. Alpha, beta, and gamma radiations are all forms of ionizing radiation. The chronic health hazards associated with exposure to ionizing radiation may include an increased risk of cancer and genetic defects. Various acute health effects are associated with high radiation exposures. An acute health effect is defined as an observable physiological change appearing within days to several weeks after exposure. Actual radiation levels and radionuclide concentrations experienced in operating the facility are well below those necessary to produce measurable acute health effects. The primary radiological concern at the MDF and PADF is the possibility of becoming internally contaminated with radioactive material.

MDF and PADF personnel could be exposed to low levels of alpha, beta, and gamma radiation through external beta/gamma radiation, radioactive air particulates, and radioactive contamination. The greatest potential for health effects is from radioactive materials at processes or material locations in which the contaminants contained in the waste stream are concentrated (e.g. sedimentation tank liquid decant system). Monitoring methods, worker exposure limits, and administrative action levels for these radiation exposure aspects are separately addressed in this plan.

5.2.1 External Radiation Exposure

Both beta and gamma radiations are emitted by the radionuclides which may be present on the equipment and therefore in the decontamination water at the MDF and PADF. External beta radiation cannot penetrate beyond the shallow layers of the skin or the lens of the eye, and so associated hazards are confined to these areas. Eye exposure to external beta radiation is greatly reduced or eliminated through the use of eye protection.

External gamma radiation, unlike beta radiation, readily penetrates deep into the body and is therefore hazardous to internal organs. Clothing and eye protection are not effective at reducing external gamma radiation exposure. Four accepted methods to minimize gamma exposures are:

- the use of shielding between personnel and the radiation source;

- minimizing time in the radiation area;
- maximizing distance from the radiation source; and
- reducing or minimizing the source of radiation.

Due to low levels of gamma radiation, external shielding designed to reduce gamma radiation exposure should not be necessary for workers at the MDF and PADF. Should external radiation be of concern, the most effective methods of reducing worker exposure to external gamma radiation will be by posting areas where elevated gamma exposure rates exist and limiting the amount of time workers spend in these areas. Systems and work assignments may be reevaluated to ensure that operators are maintaining a maximum possible distance from radiation sources.

5.2.2 Internal Radiation Exposure

Alpha radiation is the primary radiation hazard which may be present in the MDF and PADF waste streams. Personnel involved in normal operations should not encounter quantities of radioactive material above RFETS Radiation Control Manual (RCM) Table 2.2 unrestricted release limits in normal influent waters. Alpha radiation, due to its relatively large mass and charge, does not pose an external hazard and will not penetrate the outer layer of dead skin cells. However, alpha radiation is a significant internal hazard due to the large amount of energy deposited in small, localized areas of internal organs. Alpha radiation is principally admitted to the body by inhalation of airborne contamination but ingestion, injection, and absorption of surface contamination through the skin are also possible. Radioactive contamination existing in the form of loose material is capable of migrating or being transported by a variety of mechanisms such as movement of personnel, vehicles, equipment, and wind.

Air particulates that are suspended or have settled out on horizontal surfaces (equipment) and have been resuspended pose an inhalation hazard. Drinking contaminated water, eating contaminated food, and/or transferring contamination to the mouth pose an ingestion hazard. Abrasions, lacerations, or punctures of the skin resulting from contact with contaminated surfaces pose an injection hazard. Absorption hazards exist when radioactive isotopes are chemically incorporated in a substance that is able to permeate the skin.

Exposure to radioactive contamination and the potential for internal contamination can be controlled by the proper use and removal of PPE; administrative controls in controlled areas including prohibitions against smoking, eating, drinking and chewing; and proper use of respirators when airborne contamination above prescribed limits is possible or suspected.

5.3 OPERATIONAL SAFETY HAZARDS

The primary operational safety hazards associated with work at the MDF and PADF and the control measures which will be implemented include the following:

- Injuries from moving and/or energized parts and machinery; engineering controls include the installation of guards to prevent contact with moving machinery; administrative controls include the use of lock out/tag out procedures to prevent injury from energized and/or pressurized systems. Additional precautions will be taken if the hazard cannot be completely mitigated using these methods.

- Injuries from pressurized equipment and parts; close attention will be paid to high pressure water systems in use at the MDF and PADF. Controls include safety training prior to use of equipment, inspection of equipment prior to operation, the proper use of personal protective equipment, and strict adherence to approved Standard Operating Procedures.

- Injuries from defective tools or mishandling of tools, materials, or equipment; controls will include inspection of all tools prior to use for defects or damage and thorough training of operational personnel in the proper handling and use of the materials and equipment in use at the treatment facility; proper equipment use will be controlled through the use of approved Standard Operating Procedures.

- Injuries from falls during work performed at above ground locations or from being struck by falling objects; controls will include training and use of the proper fall protection equipment and use of hard hats where construction hazards are present.

- Injuries from slips, trips, and falls from working on wet surfaces or in inadequately illuminated work areas; controls will include proper housekeeping and control of liquid and snow and ice on walking surfaces and the use of slip resistant surfaces; adequate lighting will be provided and maintained in all work areas requiring access.

- Injury during work in confined spaces; All entries into designated confined spaces will be performed in accordance with the Health & Safety Practices manual, section 1-E36-HSP-6.04 (Confined Space Entry Program).

- Injuries from failure to wear proper personal protective equipment; Section 8.0 of this Health and Safety Plan contains requirements for selection and use of personal protective equipment during all tasks associated with operation and maintenance of the treatment facility. Operational personnel receive training in the use of personal protective equipment and are required to read and acknowledge understanding of the contents of this plan. Additionally, Daily Safety Briefings are conducted at the beginning of each shift to discuss planned activities and control measures required, including the proper personal protective clothing. Safety concerns for non-routine activities will be addressed in the requisite pre-evolution briefing.

5.4 ENVIRONMENTAL AND BIOLOGICAL HAZARDS

In addition to the hazards described above, during the operation and maintenance of the MDF and PADF, there is the potential for worker exposure to high winds, serious temperature extremes, biological hazards, and noise. High winds pose a hazard to workers in areas outside the MDF and PADF buildings. Outside work will be curtailed due to sustained winds following RFETS Plant announcements. Potentially serious temperature extremes could produce heat related illnesses such as heat stroke, heat exhaustion, and heat cramps for workers outside the buildings. During extreme cold weather, the primary hazards of concern for workers outside will be hypothermia and frostbite.

The main biological hazards of concern, again primarily outside the buildings, will be insect and snake bites. Hantavirus from mouse droppings may also be a concern in areas that mice inhabit. Contact Health and Safety personnel if there is any question of a biological hazard.

6.0 GENERAL SITE REQUIREMENTS

Given the diverse nature and potential effects of the expected contaminants at the MDF and PADF, safety precautions are necessary to ensure maximum protection of human health and the environment. This section presents general requirements which apply to all activities on the site. The purpose of these requirements is to ensure that operators and other subcontractor personnel involved with the operation of the MDF and PADF are properly prepared for the activities they will be performing.

6.1 EMPLOYEE TRAINING

All operators and associated personnel working on this project shall be trained in accordance with the requirements of 29 CFR 1910.120(e). A training file for each subcontractor site employee will be maintained on site. This training file will include certificates and training records required by the subcontractor as well as site specific forms generated by the main contractor. A training file containing the subcontractor records will also be maintained at the contractor's project management office.

6.1.1 40-Hour Hazardous Waste Training

This training shall be a 40-hour hazardous waste course comparable to RFETS HAZWOPER training and shall fulfill the requirements of 29 CFR 1910.120(e).

6.1.2 24-Hour On-The-Job Training

In conjunction with 40-hour Hazardous Waste Site Training, a site specific OSHA 24-hour on-the-job training shall be given to all workers and properly documented. This shall consist of a review of site contaminants and hazards, the contents of this plan, and the actions to be taken in the event of emergencies. Employees shall also be trained on the use of MSDS sheets which will be available to all personnel for chemicals used at the MDF and PADF.

6.1.3 Respiratory Protection Training

The subcontractor Respiratory Protection Program (RPP) has been approved by the main contractor Industrial Safety

and Health. Respiratory protection training is integral to the RPP. Field personnel will complete the level of respiratory protection training that is appropriate to their job description (in accordance with 29 CFR 1910.134 and HSP 7.03) during initial 40 hour OSHA training and annually thereafter. Topics that will be covered for the subcontractor operations personnel at the MDF and PADF will include the following:

- Overview of respiratory protection;
- Physiology of the respiratory system;
- Classification of respiratory hazards;
- Air-purifying respirators;
- Respirator selection, use and limitations;
- Fit testing, maintenance and cleaning;
- Examination.

6.1.4 Supplemental Training

Supplemental training shall include the following:

- 8-hour OSHA Supervisor Training (managers, supervisors, site Health and Safety Officer);
- Current 8 hour OSHA refresher training (all employees); in accordance with 29 CFR 1910.120;
- Respiratory Protection Training (all employees);
- First Aid and CPR Training (at least one employee per shift and the HSO);
- Confined Space Entry Training (all employees);
- Pressure Safety Awareness and Intermediate Pressure Safety (operators and HSO);
- Decontamination Facility Qualification Training
- Radiation Worker Level II Training

The RTG Site Manager shall be responsible for verifying the current status of training for all employees assigned to the project. Any deficiencies shall be cleared prior to the employee beginning work on the field portion of the project.

Finally, all employees must read and acknowledge in writing that they have read this site specific Health and Safety Plan. A sample acknowledgement form is shown on Figure 6.1. Blank forms must be kept in the site office and will be accessible to the on duty operator at all times. Original signed forms for project personnel will be kept in the project files. All personnel working under the project Health and Safety Plan will also read and understand the subcontractor Health and Safety Program Manual. The preceding requirements are those that must be satisfied for any subcontractor field work regardless of the site. There are also many site-specific training requirements and qualifications for particular job descriptions or tasks. These requirements shall be addressed on an individual basis as needed. All operations personnel will receive site specific training pertaining to chemicals and materials used in the operation of the MDF and PADF regarding the routes of exposure, adverse health effects, and first aid.

Figure 6.1 Health and Safety Plan Acknowledgement Form

RESOURCE TECHNOLOGIES GROUP, INC.

HEALTH AND SAFETY PROGRAM
HEALTH AND SAFETY PLAN
ACKNOWLEDGEMENT

Project Number _____

Project Name _____

Project Location _____

I hereby acknowledge that I have been given a safety briefing on the work I am to do on the above-referenced site. I understand that the site may contain materials classified by EPA or others as potentially hazardous. I have read and understand the safety plans for this project and will adhere to the procedures contained therein. I have been instructed in and understand the use of the safety equipment for this project.

Employee

Date _____

Print Name _____

Signature _____

Project Manager or Representative

Date _____

Print Name _____

Signature _____

6.2 MEDICAL MONITORING

All employees assigned to a field project at a hazardous waste site shall be part of a Medical Monitoring Program and shall comply with the requirements of 29 CFR 1910.120(f). The subcontractor Project Manager shall be responsible for verifying the current medical monitoring status for all employees assigned to the project. An annual physical and medical evaluation is required of all subcontractor personnel to be cleared to work on site. Any deficiencies shall be cleared prior to the employee doing any field work on the field project. Written records showing an employee is not restricted from working on a hazardous waste site (and establishing fitness to wear a respirator, if applicable) shall be maintained at the on site project office.

6.3 DAILY SAFETY BRIEFINGS

As described in Section 6.1, all workers shall receive a safety briefing on the contents of this plan prior to beginning work. In addition, a health and safety briefing shall be performed at the beginning of each shift. The briefing shall be conducted by the shift Health and Safety Officer, and shall cover the specific tasks to be performed for that shift. Health and safety concerns for planned tasks shall be reviewed, and required procedures discussed. The attendees at the briefing, and the items discussed, shall be documented in the daily Safety Briefing Report shown in Figures 6.2 and 6.3. A supply of blank Safety Briefing Forms will be kept in the operations office.

6.4 POSTING AND SITE ACCESS

The Rocky Flats Environmental Technology Site is a controlled access area with the MDF and PADF located inside the Rocky Flats controlled area fencing. Access to the working areas of the MDF and PADF shall be limited to subcontractor operations and supervisory personnel in addition to appropriate contractor management and support personnel. Personnel entering any area of the facilities shall notify MDF/PADF personnel. First time access for an individual will require a site specific safety briefing given by the facility operator and documented in the MDF/PADF Log. Any maintenance or other personnel will be trained in accordance with the requirements presented in this section and may also be accompanied by an operator, as appropriate.

No areas of the MDF or PADF are considered to be exclusion zones due to hazardous materials, radioactive materials, or physical hazards. It is still desirable to minimize and control general access to protect equipment and

prevent accidental release of hazardous or radiological materials, therefore access to all enclosed areas of the facility shall be controlled by MDF/PADF personnel.

Maps of the MDF and PADF are located in Section 3.0.

Figure 6.2 Safety Briefing Report

RESOURCE TECHNOLOGIES GROUP, INC.

HEALTH AND SAFETY PROGRAM SAFETY BRIEFING REPORT

Page 1 of 2

Project Number _____ Name _____

Project Location _____

Project Manager _____

Site Health and Safety Officer _____

Date _____ Weather _____

Task Specific Safety Requirements

Task: _____

_____

Personnel:

Name	Assignment

Safety Requirements: _____

_____

_____

_____

_____

Task Specific Safety Requirements

Task: _____

_____

Personnel:

Name	Assignment

Safety Requirements: _____

_____

_____

_____

_____

Figure 6.3 Safety Briefing Report (Page 2)

RESOURCE TECHNOLOGIES GROUP, INC.

HEALTH AND SAFETY PROGRAM
SAFETY BRIEFING REPORT

Page 2 of 2

Task Specific Safety Requirements

Task: _____

Personnel:

Name	Assignment

Safety Requirements: _____

Task Specific Safety Requirements

Task: _____

Personnel:

Name	Assignment

Safety Requirements: _____

Briefing Acknowledgement:	Printed Name	Signature
Briefing Conducted By:		

6.5 BUDDY SYSTEM

All work that requires personnel to directly handle, sample or transport hazardous materials, hazardous waste or waste containers at Rocky Flats requires the use of the buddy system. This includes drum or chemical transfers, and maintenance of equipment used in conjunction with hazardous material. The buddy system ensures that each worker is observed by another worker who can provide rapid assistance in case of emergency. In addition, any work requiring greater than Level D protection requires use of the buddy system. MDF and PADF personnel may conduct inspections and minor maintenance without the use of the buddy system provided radio contact is maintained. At no time shall any worker engage in any kind of pressurized water decontamination or emergency response without the use of the buddy system. Workers shall immediately evacuate the danger area upon discovery of a potential emergency situation.

7.0 EMERGENCY RESPONSE PLAN

This project involves the operation and maintenance of existing decontamination facilities. Potential emergency situations during work at the facilities include fire, hazardous substance release, employee contamination, accidents and injuries. Safety precautions will be taken to avoid emergency situations. However, if an emergency does arise, the procedures described in this section will be followed. Also, preparatory steps necessary for responding to an emergency situation are given below and they should be complied with before beginning any work at the site.

Kaiser-Hill maintains an emergency response telephone extension of **2911** at RFETS. Extension **2911** may be reached from any plant site telephone and will immediately connect the caller with the Fire Department, Plant Security, the Central Alarm Station, the Shift Superintendent and, during first shift, Occupational Health. If evacuation is necessary, exit the facilities or trailer via the nearest exit and proceed to the primary assembly area. The primary assembly area when evacuating either T891D or T891P is conex 15 located between the two rows of cargo containers directly north of Building 891. The primary assembly area when evacuating the MDF is conex 50 located in the east end of the contractors yard. The primary assembly area when evacuating the PADF is the east end of Building 964 located southwest of the PADF. If the primary assembly area is downwind from the event that makes evacuation necessary, go to the secondary area. The secondary assembly area for evacuation of T891D and T891P is the southeast corner of Building T891C. The secondary assembly area for evacuation of the MDF is the equipment storage conex located to the east of the facility. The secondary assembly area for evacuation of the PADF is the Protected Area perimeter road east of the facility. Once there, be certain that your supervisor has accounted for you and follow management directions. Emergency escape routes are posted at each facility and building and personnel who frequent them should be familiar with the escape route from any given location at the facilities or buildings. Please note that there is no operation within the MDF or PADF that is vital enough to delay an evacuation for even an instant.

7.1 FIRE

The first responsibility of any employee discovering a fire is to raise the alarm. UNDER NO CIRCUMSTANCES SHOULD ANYONE ATTEMPT TO FIGHT A FIRE ALONE. Those personnel trained as First Responders may then use a fire extinguisher or de-energize small fires in those situations where there is no personal danger in doing so. Fire extinguishers at the MDF are located at: the two doors in Building 903B; the southwest corner of the

decontamination pad; the west side of the health and safety shed; and in all pieces of heavy equipment. Fire extinguishers at the PADF are located at; the northwest corner of the decontamination pad; the north side of the conex located just south of the facility; and in all pieces of heavy equipment. Fire extinguishers for T891D and T891P are located at the exits.

All personnel should move or be moved to a safe distance from any area involved in a fire situation. There is no installed fire alarm system at either the MDF or PADF or in T891D or T891P so the emergency extension at **2911** shall be called immediately. The RTG Site Manager shall immediately notify subcontractor and contractor personnel.

7.2 HAZARDOUS SUBSTANCE RELEASE

7.2.1 Spill Response Planning

The Spill Response Plan is designed to establish a program/plan to optimize a safe and informed response to incidental and emergency situations with the intent of protecting personnel, the public and the environment. In addition to safeguarding MDF and PADF personnel, the plan is designed to protect RFETS personnel and the public from contaminants that could potentially move offsite, protect property adjacent to the storage areas from potential hazards within the storage areas, and prevent equipment loss as a result of fire, explosion, or contamination.

7.2.2 Incidental Spill Operations

Incidental Spill Definitions:

An incidental release is a limited quantity release of a hazardous substance which does not pose a significant safety or health hazard to employees in the immediate vicinity or to the employee cleaning it up. In addition, the release does not have the potential to become an emergency within a short time frame.

Incidental spills at the MDF and PADF are limited to quantities controllable by the personnel at the spill. They each have secondary containment under the entire facility which collects spills and precipitation. The liquids

contained in the MDF and PADF tanks have had extensive chemistry and radiological analysis performed which reveal a very low hazard to health and environment.

Spills considered as incidental include:

- Controllable MDF and PADF Decontamination Water spills less than 500 gallons inside secondary containment.
- Gasoline and diesel spills less than 1 pint.
- Acid spills less than a few drops, and the individual observing the spill is trained, capable and has the proper PPE and materials to respond.
- An acid spill shall be considered an emergency if anyone must respond to the spill from outside the area.
- A small mercury spill, such as from a thermometer can be responded to as an incidental spill if the proper spill kit is available.

Personnel immediately responding to the spills shall use the appropriate spill kits available at the site of the spill. If a spill kit for diesel, gasoline or mercury is not available then an emergency response is required.

7.2.3 Emergency Spill Operations

Emergency Spill Definitions:

An emergency response includes, but is not limited to, the following situations:

- The responders are not in the immediate response area;
- The release requires evacuation of employees in the area;
- The release poses, or has the potential to pose, conditions that are Immediately Dangerous to Life and Health (IDLH);
- The release poses a serious threat of fire or explosion (exceeds or has the potential to exceed the lower flammable limit);
- The release may cause high levels of exposure to toxic substances;
- There is uncertainty that the employees in the work area can safely handle the severity of the hazard with the available PPE and equipment.

Emergency Spill Response Actions

- IF a release is observed, THEN immediately warn coworkers in the contaminated area and notify supervision on EMAD 11.
- Shut off pumps transferring liquid if safe to do so.
- Close valves to stop flow into affected area or line.
- Move to a safe location upwind and post a person upwind to prevent unauthorized personnel from entering the contaminated area.
- Notify Site Manager or main contractor manager on EMAD 11. IF supervision is not available, notify Shift Supervisor at 966-2914.
- Call 966-2911 or use radio channel 2911 and provide the following information:
    - Exact location of the emergency (nearest road, etc.)
    - Nature of the emergency
    - Condition of patient if applicable (breathing, consciousness, bleeding, etc.)
    - Special hazards in the area
    - Your name
    - Building number, Cargo number, or Unit number
    - Any other information requested

- If no details are given, emergency response personnel will respond automatically.
- Other notification requirements are described in Hazardous Waste Requirements Manual, Release Response and Reporting (1-C49-HWRM-04) and ADM 16.02.

7.2.4 Post-Spill Response Actions

Equipment used for spill response will be decontaminated at the Decontamination Facilities or be washed with a soap solution and triple rinsed. Non-reusable items used for decontamination and decontamination wash water will be handled per the Hazardous Waste Requirements Manual and Field Operation Procedures. The Site Manager will ensure that spill kit materials are restocked and a post-spill review is performed.

7.2.5 MDF, PADF, and Laboratory Release Hazard Analysis

Table 7.1 contains a hazard analysis of all materials at the MDF, PADF, and T891C laboratory that have the potential to be released and the appropriate level of personal protective equipment required for spill response. This listing of appropriate PPE should not to be construed as permission for personnel lacking the proper training to respond to a spill.

Table 7.1 Spill Response Hazard Analysis

MATERIAL SPILLED	SPILL PROCEDURES	PERSONAL PROTECTIVE EQUIPMENT REQUIRED[a]
Decontamination Waste Water	Contain spill; absorb with universal absorbents or recover with wet vacuum or pump; place in appropriate container for disposal.	Polycoated Tyvek® Safety shoes with rubber boot covers Inner and outer chemical resistant gloves
Diesel Fuel	Contain spill; absorb with hydrocarbon absorbents; place in appropriate container for disposal.	Total body Saranex suit Safety shoes with rubber boot covers Inner and outer chemical resistant gloves
Gasoline	Contain spill; absorb with hydrocarbon absorbents; place in appropriate container for disposal.	Total body Saranex suit Safety shoes with neoprene boot covers Inner and outer chemical resistant gloves
Hydrochloric Acid	Flush with water; neutralize with soda ash or lime only with adequate ventilation as carbon dioxide is generated; eliminate sources of ignition as hydrogen gas may be generated; place in appropriate container for disposal.	Polycoated Tyvek Safety shoes with neoprene boot covers Neoprene or butyl gloves.
Mercury	Contain spill; use mercury spill clean up kit; place in appropriate container for disposal.	Polycoated tyvek Neoprene or butyl gloves
Nitric Acid	Flush with water; neutralize with soda ash or lime only with adequate ventilation as carbon dioxide is generated; eliminate sources of ignition as hydrogen gas may be generated; place in appropriate container for disposal.	Polycoated Tyvek Safety shoes with neoprene boot covers Neoprene or butyl gloves
Sediments/Sludge	Place sludge material in appropriate container for disposal; perform decontamination of area with soap and water.	Polycoated Tyvek coverall Safety shoes with neoprene boot covers Neoprene or butyl gloves
Sodium Hydroxide	Flush with water; neutralize with dilute acid; pick-up spill with vacuum or pumping equipment; place in appropriate container for disposal.	Polycoated Tyvek or apron Safety shoes with neoprene boot covers Neoprene or butyl gloves
Sodium Thiosulfate	Promptly shovel up dry chemical into an empty container, cover and store in a cool, dry place. Mixing with strong oxidizers cause strong exothermic reactions. Mixing with acid liberates sulfur dioxide gas which is toxic, corrosive and an oxidizer.	Polycoated coveralls with hood Inner nitrile/latex gloves
Sulfuric Acid	Cover with sand; neutralize with soda ash, lime, or neutralizer only with adequate ventilation as carbon dioxide is generated; place in appropriate container for disposal.	Polycoated Tyvek Safety shoes with neoprene boot covers Elbow length neoprene or butyl gloves.

[a] Respiratory protection will be based on air monitoring results.

7.3 EMPLOYEE CONTAMINATION

If any site worker experiences a failure or alteration of protective equipment that affects the protection factor, that person and his/her coworker(s) will immediately leave the work area for which the PPE was required. Re-entry to the area will not be permitted until the equipment has been repaired or replaced. If any incidents occur that involve the contamination or exposure of an employee to hazardous or toxic substances, the RFETS emergency extension at **2911** shall be notified immediately.

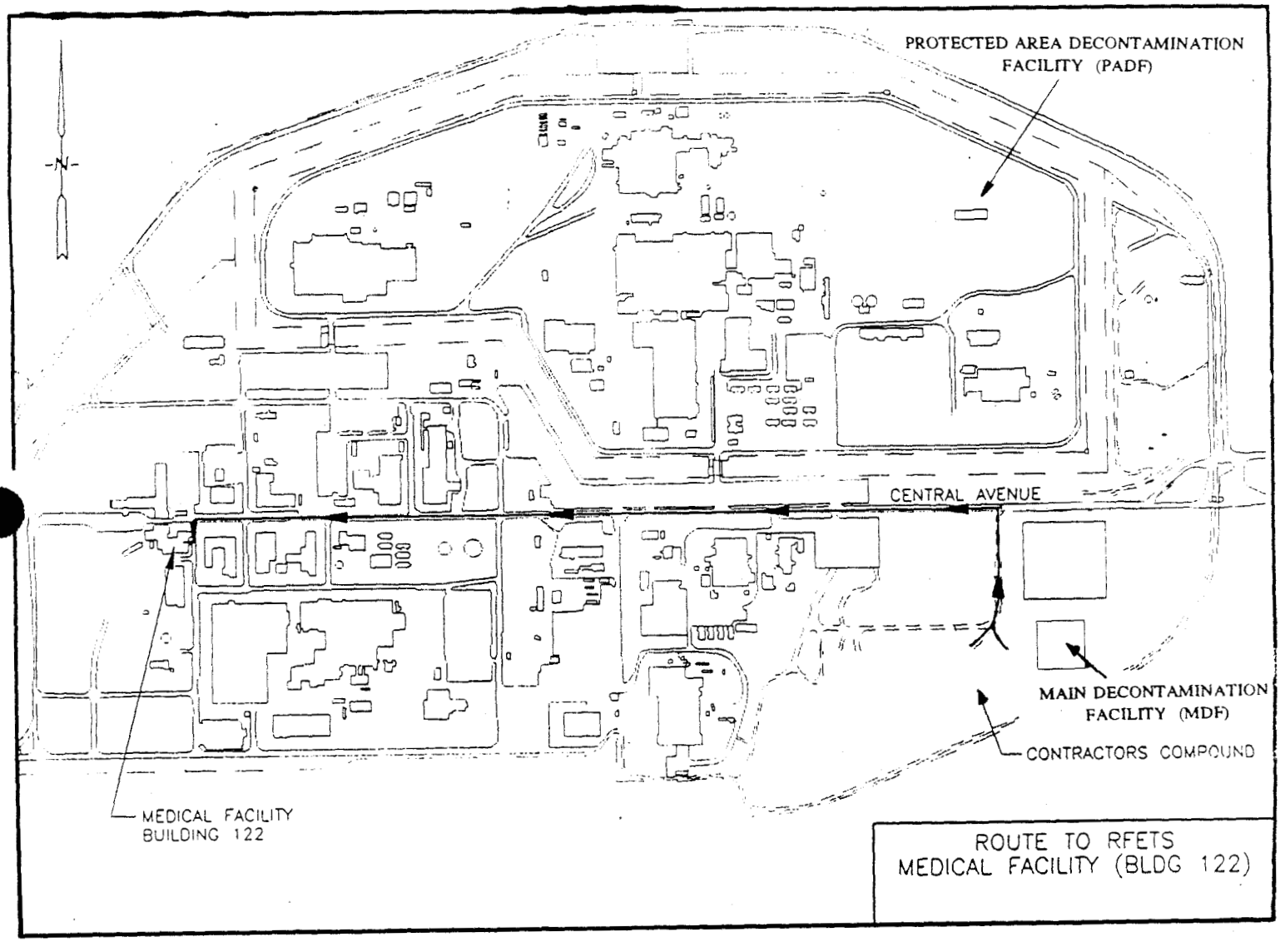
First aid or other decontamination procedures should be administered if they can be without endangering other operations personnel. Contaminated personnel should proceed to the nearest decontamination safety shower and thoroughly irrigate the contaminated area(s). An eyewash station is located in Building 903B and safety showers are located in T891Q and Building 891. No contamination situation at the MDF and PADF will be made worse by the use of large amounts of water. A first aid kit is located in Building 903B at the MDF and in the health and safety shed at PADF. Personnel shall notify project management and the subcontractor supervision immediately. Consult the chemical specific MSDS for direction concerning the chemical(s) involved.

7.4 ACCIDENT / INJURY

In the event of an accident or other event that causes injury to operations or any other personnel present at the MDF or PADF, the RFETS emergency extension at **2911** shall be notified immediately. The site Fire Department, EMT's and Security will be dispatched immediately. Details of the emergency and the exact location must be given over the phone. Basic first aid may be administered by properly trained personnel until emergency medical assistance is available. First aid kits are located in the health and safety sheds at both the MDF and PADF, in each vehicle used in the field, and in the health and safety trailer. Each shift will have a minimum of one subcontractor staff member trained in American Red Cross First Aid and CPR. Any non-emergency medical situation such as minor cuts or sprains should be attended to at RFETS Medical - Building 122. A map showing the location of Building 122 is shown in Figure 7.1

Subcontractor personnel shall immediately notify project management and the subcontractor supervisor of any accident or injury.

Figure 7.1 Map to RFETS Medical - Building 122



7.5 COMMUNICATIONS

Due to the small work areas at the MDF and PADF and requirement of the "buddy system" during work activities, face to face communication among workers is generally maintained. Two way radios are required when personnel are conducting work, such as minor maintenance, which does not require the use of the "buddy system". Any work required at other areas of the RFETS plant site requires the availability of two way radios for emergency use. The on-site emergency phone number is **2911** which is the Rocky Flats emergency extension.

7.6 INCIDENT REPORTING

The following list of supervisory personnel and their telephone numbers will be posted by the telephone(s) closest to ongoing field activities. One RMRS and one RTG staff member will be notified using the call-in order listed of any spill, release, personnel contamination, accident or injury, major equipment failure or out of specification discharge. Complete the reporting process in accordance with procedure 1-66100-HSP-3.03, Reporting Occupational Injury or Illness and Vehicle or Property Damage.

Table 7.2 Emergency Telephone Numbers

RMRS Emergency Contacts	Telephone Number
Contact: Mike Bemski	RFETS Phone: 966-4090 [redacted]
Backup: Russ Cirillo	RFETS Phone: 966-5876 [redacted]
Backup: Ty Vess	RFETS Phone: 966-6540 [redacted]

If none of the project management personnel listed above are available, contact the RFETS Shift Superintendent at 966-2914.

RFETS Emergency Response Extension: **2911**

RTG Emergency Contacts	
RTG Site Manager Contact: Terry Toler	RTG Phone: 966-6377 [redacted]
RTG Site Health and Safety Officer Contact: David Barnes	RTG Phone: 966-5352 [redacted]
RTG Health and Safety Officer Contact: Bart Conroy	RTG Phone: 969-8511 [redacted]
RTG Operations Manager Contact: Mike Griffin	RTG Phone: 969-8511 [redacted]
RTG Program Manager Contact: Erich Tiepel	RTG Phone: 969-8511 [redacted]

8.0 PERSONAL PROTECTIVE REQUIREMENTS

The purpose of personal protective equipment (PPE), including clothing, is to shield or isolate individuals from the chemical, physical and biological hazards that they may encounter at sites containing hazardous or toxic materials. The careful selection and use of PPE will protect the respiratory system, skin, eyes, face, hands, feet, head, body, and hearing.

No single combination of protective equipment and clothing is capable of protecting against all hazards, and PPE must be used in conjunction with other protective methods. The use of PPE can in itself create significant worker hazards, such as heat stress, physical and psychological stress, impaired vision, mobility, and communication.

Specific protective garments are selected on the basis of a variety of criteria. In general, the greater the level of PPE, the greater the associated risks. For any given situation, equipment and clothing must be selected to provide an adequate level of protection. Over-protection as well as under-protection can be hazardous and should be avoided.

Table 8-1 summarizes PPE requirements for specific tasks associated with operation of the MDF and PADF. Non-routine tasks which are not addressed in Table 8.1 will be addressed via an Activity Hazard Analysis on a case-by-case basis by the RTG Health and Safety Officer and the appropriate level of PPE will be approved by the RMRS Project Manager, the RMRS Health and Safety Supervisor, and Radiological Engineering (if applicable). The following sections detail the criteria for selecting specific PPE which will apply to this project.

Table 8.1 Personal Protective Equipment Summary

Task	Level	Body	Foot	Head[1]	Eye	Hand	Respirator [2,3,4]
Routine Decontaminations	D	Polycoated Tyvek®	Sixteen inch high, rubber, steel toed boots	None required	Safety glasses with face shield	Inner and outer nitrile gloves	None required
Routine purges of portable tanks	D	Work clothes with splash apron	Safety shoes	None required	Safety glasses	Inner nitrile gloves	None Required
Routine pumping of effluent into tanker trucks	D	Work clothes with splash apron	Safety shoes	None required	Safety glasses	Inner nitrile gloves	None required
Elevated work (Heights >6 ft)	D	Full body harness	Safety shoes	None required	Safety glasses	None required	None required
Inspections while on catwalks above sedimentation or storage tanks	D	Work clothes	Safety shoes	None required	Safety glasses	None required	None required
Work while on catwalks above sedimentation or storage tanks	VARIES DEPENDING ON WORK BEING DONE. CONSULT WITH HEALTH AND SAFETY.						
Operation of portable pumps to transfer water	D	Work clothes with splash apron	Safety shoes	None required	Safety glasses (Face shield optional)	Nitrile or butyl gloves	None required
Loading or offloading portable clean water tank	D	Work clothes	Safety shoes	None required	Safety glasses	Nitrile gloves	None required
Miscellaneous maintenance work	D	Work clothes	Safety shoes	None required	Safety glasses	Leather work gloves or none required	None required
Collecting water or sediment samples (unpressurized)	D	Work clothes	Safety shoes	None required	Safety glasses	Nitrile gloves	None required
Collecting water or sediment samples (pressurized)	D	Work clothes	Safety shoes	None required	Safety glasses with face shield	Nitrile gloves	None required

1 The RTG Health and Safety Officer and RMRS shall specify hardhat areas.
2 Respiratory protection requirements based upon continuing monitoring for airborne contaminants as discussed in Section 8.2.
3 Respirators will be required if contaminants are >½PEL or >10%DAC measured or expected.
4 Respirators will be required if Hantavirus contamination is suspected

8.1 CLOTHING

The use of Level D protective equipment is defined by the following criteria:

- No contaminants are present, or contaminants are present below the action levels established in the HASP for respirator use; **and**
- Work functions preclude splashes, immersion, or potential for unexpected inhalation of any chemicals.

Experience with the MDF and PADF operations indicates that the chance of encountering contamination in the work area is minimal given the low concentration of contaminants. Therefore, Level D and modified level D protection will be adequate during most normal work activities. This is a field work uniform affording minimal protection, consisting of the following PPE:

- Safety boots, leather or chemical resistant, with steel toe and shank.
- Safety glasses (ANSI Z87.1-1989 compliant) with side shields or goggles.

The following additional PPE may be required as part of Level D protection depending on the specific tasks being performed:

- Coveralls;
- Work gloves;
- Face shield.
- Hard hat

In addition, proper chemical resistant gloves shall be worn when handling chemicals. Face shields and aprons shall also be worn during operations with the potential for splashing. A poly-coated Tyvek suit may also be worn if the splashing potential is judged to be high. Tank top shirts, shorts, and tennis shoes are not permissible. PPE shall meet the requirements applicable to ANSI and OSHA standards. Where appropriate and more stringent, the subcontractor will comply with RFETS PPE requirements. Modifications or substitutions of the PPE specified herein shall require the concurrence of the Site Safety Officer and be subject to written approval by RMRS project management.

If air monitoring as described in Section 9.0 indicates the presence of organic vapors in excess of action levels, Level C PPE may be required. The RTG Respiratory Protection Program is not approved for airborne radioactive contamination and RTG operations personnel shall not enter an Airborne Radioactivity Area (ARA) under any circumstances. Health and Safety Specialists who may be required to enter such areas will be qualified under RFETS Respiratory Protection Program. The PPE for Level C shall include the following:

- Full-face air-purifying respirator with appropriate cartridges or canisters;
- Chemical-resistant clothing consisting of:
  - hooded one- or two-piece chemical splash suit, or
    chemical-resistant hood and apron, or
    disposable chemical-resistant coveralls
  - inner and outer chemical resistant gloves, and
  - chemical-resistant safety boots with steel toes.

- Optional
  - hard hat
  - outer disposable chemical-resistant boot covers,
  - face shield,
  - 2-way, intrinsically safe radios,
  - long cotton underwear.

The criteria to evaluate when considering whether Level C PPE is required include the following:

- Oxygen concentrations are greater than 19.5 percent and less than 23.5 percent by volume;
- Measured air concentrations of identified substances will be reduced by the respirator below the PEL, TLV, or REL, and the concentration is within the service limit of the cartridge;
- Atmospheric contaminant concentrations do not exceed IDLH levels;
- Atmospheric contaminants, liquid splashes, or other direct contact will not adversely affect anyone left unprotected by chemical-resistant clothing;
- Job functions do not require self-contained breathing apparatus; and

- Continuous direct readings on monitoring instruments, such as FIDs or PIDs, are within the action levels prescribed in the HASP for air-purifying respirator use.

The main selection criterion for Level C, as opposed to the more restrictive Level B, is that conditions permit wearing air-purifying respirators. Cartridges must be able to remove the substances encountered.

A full-face, air-purifying respirator can be used only if all of the following conditions are met:

- Oxygen concentrations are greater than 19.5 percent and less than 23.5 percent by volume;
- The substance in question has adequate warning properties;
- The individual using the mask has passed at least a qualitative fit-test;
- The individual has medical clearance for the use of respirators; and
- The appropriate cartridge is used and its service limit concentration is not exceeded.

The chemical and radiological hazards expected to be encountered at the MDF and PADF were discussed previously in Section 5.0 and presented on Table 5.1 and Table 5.2. It is apparent from reviewing this information that a full-face respirator with a combination organic vapor - acid gas - HEPA cartridge should be adequate in situations that require respiratory protection and will be maintained at the site in the event that they are required. If experience and data indicate that the contaminants are significantly different than those discussed in Section 5.0, then the respiratory protection requirements must be reevaluated.

An air surveillance program is part of all hazardous material/waste site operations when atmospheric contamination is known or suspected. It is mandatory that the ambient air be thoroughly monitored when personnel are wearing air-purifying respirators. Surveillance using a photoionization detector (PID), colorimetric tubes or other air sampling equipment, in accordance with the HASP, is required during all Level C and B operations to detect changes in air quality necessitating a higher level of respiratory protection. Level C protection with an air purifying respirator will be worn routinely in an atmosphere only after the type of air contaminant is identified, concentrations measured, and the criteria for wearing air purifying respirators are met.

8.2 RESPIRATORY PROTECTION

The requirements for respiratory protection have been discussed briefly in Section 8.1 and will be presented in greater detail in this section. Respiratory protection requirements shall be based on air monitoring data. Air quality shall be monitored with a photoionization detector (PID) equipped with an 11.7 eV lamp, colorimetric tubes, combustible gas indicators, or personal air samplers. Action levels for respiratory protection are listed in Tables 5.1 and 5.2, and shall generally be one-half the applicable OSHA PEL as listed in the Table 5.1.

Exposure to the VOC's listed is possible when: decontaminating VOC contaminated equipment, breaking the integrity of the process systems, sampling influent or effluent waters, transferring influent or effluent water, and opening sediment or storage tanks. Air monitoring with a PID will be conducted during all the above listed work activities.

PID air monitoring of all work areas combined with periodic spot checking of sampling and water transfer operations will be performed to monitor contaminant levels. **Note:** Due to the variable response of the PID to different compounds, any reading above background will be the action level unless the compound of concern and the PID response factor is known. If levels above background are detected and the compound and the response factor are not known, monitoring with colorimetric tubes and/or air sampling will be necessary in determining the appropriate respiratory protection. Any analysis of personal air samples will be performed for the compounds of interest by an independent AIHA accredited industrial hygiene laboratory approved by RMRS. The RTG Health and Safety Officer, the RMRS Project Manager and the RMRS Health and Safety Supervisor will review the results of personal air samples to determine whether engineering controls can be installed to minimize the concentration of VOC's. If engineering controls can be utilized, they will be recommended and installed upon approval.

If engineering controls are not practical, work may continue only after air monitoring results are completed and with the concurrence of the RTG Health and Safety Officer and the RMRS Health and Safety Supervisor.

8.3 GENERAL REQUIREMENTS FOR CHEMICAL HANDLING

Direct contact with all chemicals shall be prevented with the use of chemical-resistant personal protective equipment as described in Table 8.1. and Section 8.1. Emergency eyewash stations are located inside the operations areas the MDF and PADF. The subcontractor operations personnel shall ensure that the eyewash stations are in operable condition prior to facility operations. Emergency eyewash stations shall be inspected in accordance with Rocky Flats Plant ODM-PO-2 and the condition documented. Transfer of chemicals shall be performed only within approved secondary containments.

8.4 GENERAL REQUIREMENTS FOR CHEMICAL STORAGE

Chemicals shall be stored in the approved chemical storage containers to prevent inadvertent mixing of incompatible materials. Container labeling shall be maintained in accordance with RFETS requirements and the NFPA hazard warning system.

8.5 CONFINED SPACE ENTRY

Posting of and entry into Confined Spaces will be performed according to the Health & Safety Practices manual (section 1-E36-HSP-6.04) by personnel who have received Confined Space Entry training. A hazard evaluation by RTG Health and Safety, with RMRS Health and Safety Supervisor approval, will be performed prior to any confined space entry.

8.6 COMPRESSED GAS HANDLING AND STORAGE

MDF and PADF personnel utilize industrial hygiene instruments that require compressed gas calibration. Cylinders will be stored, labeled, handled, transported and used in accordance with the requirements contained in 29 CFR 1910.101, Compressed Gases, and HSP 11.01, Compressed Gas Cylinders.

9.0 AREA MONITORING

Monitoring of the environmental conditions in and around MDF and PADF must occur because of the potential for contaminants to be present in environmental media, items being decontaminated, the water being generated, and waste sediments. The following sections describe the monitoring program to be implemented and appropriate exposure limits and actions levels. Where feasible, personnel exposures to hazardous materials (other than radioactive substances) shall be maintained within the TLVs adopted by the ACGIH or the PELs adopted by OSHA, whichever is more stringent. Exposure to radioactive material will be maintained below the RFETS administrative limits. Table 9.1 presents a summary of the monitoring program.

9.1 CHEMICAL MONITORING

Air monitoring for VOC's will be conducted using a HNU Systems, Inc., Model DL-101-2, Photoionization Detector (PID) equipped with a 11.7eV lamp. The PID consists of an ultraviolet lamp and an ion chamber and measures the concentration of gases in parts per million (ppm) using the principle of photoionization. The PID has a range of 0 - 2000 ppm. The PID will be calibrated with a 100 ppm standard of isobutylene prior to use and a yearly factory calibration is recommended. The lamp, probe, and filters will be cleaned and/or replaced periodically.

Air monitoring for VOC's shall be conducted in and around the MDF and PADF using a PID device with at least an 11.7 eV lamp prior to operations and during the following tasks:

- when decontaminating known VOC contaminated equipment;
- when sampling uncharacterized water;
- when opening either sediment or storage tanks;
- when breaking the integrity of the process system; and
- when opening tanker lids for offloading or filling.

PID devices are used as a screening instrument to detect the presence of organic compounds but cannot quantify or identify specific volatile organic compounds. Due to the variable response of the PID to different compounds,

any reading above background will be the action level unless the compound of concern and the PID response factor is known. If levels above background are detected and the compound and the response factor are not known, personnel will leave the affected area immediately. Wearing level B PPE, RTG Health and Safety personnel will then attempt to locate, contain, and identify the source using the PID, colorimetric tubes and/or air sampling equipment. Work in level C or D respiratory protection can be resumed only when the concentration and compound(s) are known. When the compound(s) cannot be identified level B PPE will be required.

Table 9.1 Monitoring Program Summary

RADIATION			
Hazard/Sample Type	**Action Level**	**Action Level Exceeded**	**Monitoring Frequency**
Equipment and material contamination (Plutonium limits used here; for further guidance refer to the RFETS Radiological Control Manual)	Alpha contamination: >20 dpm/100cm^2 removable >100 dpm/100cm^2 total; Beta/gamma contamination: >1000 dpm/100cm^2 removable >5000 dpm/100cm^2 total.	Equipment and material decontamination.	Prior to removal from an area controlled for radiological purposes.
Personnel contamination.	>Background.	Personnel decontamination.	Prior to exiting access control.
Long-lived radioactive airborne particulates.	10% of the DAC[a] (if respirators not worn).	Full face-piece air purifying respirators (APRs) with HEPA cartridges.	As determined by Site Safety Officer and Radiological Engineering.
External shallow beta/gamma radiation exposure rate.	>5 mrem per hour.	Remove personnel from elevated beta/gamma exposure rate area and investigate source.	As specified in Section 9.2.3.

CHEMICAL			
Hazard/Sample Type	**Action Level**	**Action Level Exceeded**	**Monitoring Frequency**
Air monitoring for volatile organic compounds	50% of the most limiting PEL for specific compounds present or above background for unknown compounds.	Consult with Health and Safety for appropriate respiratory protection.	As specified in Section 9.1.

[a] DAC - Derived Air Concentration.

Table 9.1 (Cont.)

Monitoring Program Summary

MISCELLANEOUS MONITORING

NOISE

Hazard/Sample Type	Action Level	Action Level Exceeded	Monitoring Frequency
High noise levels/Work area or personal dosimetry	85 decibels in accordance with 1-I87-HSP-7.06	Suitable hearing protection.	As needed to characterize new equipment and/or operations

RESPIRABLE DUST

Hazard/Sample Type	Action Level	Action Level Exceeded	Monitoring Frequency
MiniRam dust monitoring	1.5mg/m^3	Full face-piece air purifying respirators (APRs) with HEPA cartridges.	At discretion of the RTG Site Safety Officer

HEAT STRESS

Hazard/Sample Type	Action Level	Action Level Exceeded	Monitoring Frequency
WBGT monitoring.	Varies depending on work load and if PPE is worn.[b]	Work-rest regimen, ice vests, or other RMRS approved measures.	Varies depending on PPE worn and work load.

[b] Monitoring will be performed when work area temperature exceeds 77°F. See Appendix A for guidance and action levels for work involving the use of personal protective equipment.

9.2 RADIOLOGICAL MONITORING

The radiation exposure of an occupational worker will be maintained as far below the U.S. Department of Energy (DOE) limits as is reasonably achievable. A local annual administrative dose equivalent level of 750 mrem committed effective dose equivalent is in effect. If any worker exceeds 20% of the administrative dose equivalent level, a comprehensive evaluation will be performed and if necessary, the employee will be reassigned to a job where his or her radiation exposure will be minimized for the remainder of the calendar year.

9.2.1 Personnel and Equipment Contamination

Personnel and equipment leaving a radiation or contamination area will be monitored for radiological contamination in accordance with the action levels specified in Table 9.1. Decontamination will be in accordance with 1-PO3-HSP-18.12. Release of all equipment and materials from a radiologically controlled area will be in accordance with Rocky Flats Procedures HSP 18.10 and the Radiological Operating Instructions (ROI's). Instrumentation used for personnel and equipment contamination monitoring will be those recommended by RFETS Radiological Engineering. Any alternates will be approved by RFETS Radiological Engineering. All instruments will be maintained and calibrated according to the manufacturers specifications.

9.2.2 Radioactive Air Particulate Monitoring

The main contractor is responsible for air sampling for radioactive airborne particulates. These samples will be taken in the breathing zone of workers, within the work zone, and outside the work zone.

Workers may be required to wear personal air monitoring devices to sample for radioactive particulates in the worker's breathing zone. Air sampling in the work areas will be performed at the discretion of the main contractor. Area sampling may also be performed in locations within and outside the work zone.

9.2.3 External Radiation Monitoring

After successful completion of the medical and training requirements specified in Section 6.0 of this plan, all employees who will work within the controlled area will be issued radiation monitoring badges by RFETS Dosimetry. These badges will be worn as required.

9.2.4 Internal Radiation Monitoring

The subcontractor employees who are issued radiation monitoring badges are subject to periodic urine and/or fecal samples at the discretion of RFETS dosimetry. Additional urine and/or fecal bioassay samples may be required at the discretion of the main contractor if a substantial exposure is suspected. These samples will be analyzed for radionuclides to determine whether the employee has received an internal radiation dose while performing work at the MDF or PADF. Sample containers will be provided by the dosimetry department.

9.3 MISCELLANEOUS MONITORING

9.3.1 Noise Monitoring

Noise levels shall be monitored to delineate areas where hearing protection is required. Instruments utilized will be calibrated, maintained, and operated in accordance with manufacturers instructions and will be approved for use by RMRS Health and Safety Supervision. The monitoring frequency will be at the discretion of the RTG Health and Safety Officer for previously monitored operations and as needed to characterize new equipment and/or operations . Additionally, a personal noise dosimeter may be used in conjunction with a sound level meter in order to assess noise exposures of selected individuals based upon area monitoring. Suitable hearing protection with a minimum Noise Reduction Rating (NRR) of 18 dBA shall be worn in areas with a noise level greater than 85 decibels. In addition, if personnel are exposed to an average noise level greater than 85 dBA over an 8-hour period, the affected personnel must participate in a effective hearing conservation program. Previous noise monitoring indicates that areas at the MDF and PADF exceed 85 dBA during equipment operation and these areas are posted as "Hearing Protection Required When Equipment is Operating" areas. All RTG personnel working at the MDF and PADF currently participate in a hearing conservation program.

9.3.2 Heat Stress Monitoring

Heat stress monitoring will be completed using a Imaging and Sensing Technology, Model RSS 214, Heat Stress Monitor (WBGT). The instrument is a micro-processor based Wet Bulb Globe Thermometer (WBGT) which accurately measures environmental factors which contribute to heat stress. The WBGT reading displayed by the instrument, in either Fahrenheit or Celsius, is a weighted sum of the dry bulb, wet bulb, and vernon globe temperatures. The instrument is placed in the work environment at a height of 3 to 6 feet and within 5 minutes

accurate readings can be obtained and compared evaluated. The WBGT is calibrated prior to use on a daily basis and a yearly factory calibration is recommended. Maintenance is minimal with only the wick requiring periodic replacement. Monitoring frequency will be determined by the RTG Health and Safety Officer and will depend on the work area temperature, the type of work being performed, and the type of PPE worn. See Appendix A for guidance and action levels for work involving the use of personal protective equipment.

9.3.3 Respirable Dust Monitoring

Respirable dust monitoring will be accomplished using a Monitoring Instruments for the Environment, Inc., Model PDM-3, Miniature Real-time Aerosol Monitor (Miniram). The MiniRam is an airborne particulate monitor whose operating principle is based on the scattered electromagnetic radiation in the near infrared. Air surrounding the instrument freely passes through the sensing chamber as the result of natural airflow. The MiniRam continuously senses the combined scattering from the particles in the sensing chamber and displays the dust levels in mg/m^3. Because the MiniRam is preferential to particles 0.1 to 10 micrometers in size, it is useful in determining the levels of not only respirable dust but fumes, smokes, and fogs. The instrument is calibrated using a dust free Z-Bag prior to each use and periodic cleaning of the sensing chamber is required. A yearly factory calibration is recommended. Monitoring frequency will be determined by the RTG Health and Safety Officer. Currently there are no routine tasks which generate sufficient quantities of dust to require monitoring.

10.0 SITE CONTROL

Access to the MDF and PADF shall be controlled by the subcontractor operations personnel when present. The subcontractor operators will be responsible for escorting visitors and providing a short documented briefing concerning hazards associated with visiting the MDF or PADF.

10.1 WORK ZONES

Three work zones will be established around a decontamination activity: the exclusion zone (EZ), the contamination reduction zone (CRZ), and the support zone. Radiological Engineering will be consulted for posting, entering, and exiting requirements applicable to areas contaminated or potentially contaminated with radioactive materials.

10.1.1 Exclusion Zone

The exclusion zone is an area where contaminants could or do occur. The equipment decontamination pad shall be considered the EZ when decontamination activities are being conducted. The outer boundary of the exclusion zone will be the curtains which surround the pad. The liquid waste management areas will be considered an EZ when work is being done in those areas. Access control points will be established at the periphery of the EZ to control the flow of personnel and equipment into and out of the zone and to verify that proper procedures for entering and exiting are followed.

10.1.2 Contamination Reduction Zone

In general, the CRZ will be established immediately outside the exclusion zone to minimize the migration of contaminants from the exclusion zone to clean or support areas and to reduce the exposure potential of individuals exiting the exclusion zone. All decontamination efforts will be performed in accordance with applicable sections of the EMD Operating Procedures Volume I: Field Operations, the Health and Safety Practices Manual, and the Radiological Operating Instructions. Personnel decontamination will require establishing a decontamination line containing a boot and hand wash/rinse area and provisions for disposal of personal protective equipment. After washing and rinsing boots, and hands if necessary, PPE will be removed in an appropriate sequence and placed in a plastic bag. Respiratory protection, if worn, will be the second to last PPE item removed and inner gloves will be the last item removed.

10.1.3 Support Zone

The support zone is located in a clean area immediately outside of the CRZ. The support zone shall be maintained contamination free at all times and will contain supplies, emergency equipment and support personnel.

11.0 LABORATORY SAFETY

11.1 GENERAL DESCRIPTION

Water and sediment samples will be obtained and analyzed during operation of the facilities on an as needed basis. This will include influent samples from both routine and non-routine sources, and effluent samples of water ready to be discharged into tanker trucks for transport to an on site waste water treatment facility. Sediment samples will also be taken to ensure proper labeling, handling, and disposition of waste containers. Lab work associated with this sampling will consist primarily of adding preservatives to sample containers and packaging completed samples for shipping to an analytical laboratory. The laboratory is located in T891C.

11.2 HEALTH AND SAFETY RISK ANALYSIS

There are a number of general procedures and safety practices applicable to laboratory work. The following section reviews policies and procedures for all personnel involved in laboratory operation. A comprehensive Chemical Hygiene Plan is located in the T891C laboratory.

11.2.1 Basic Safe Operating Practices

- Wear proper eye protection at all times in chemical work, handling, and storage areas. Contact lenses should normally not be worn. Goggles are essential if, for therapeutic reasons, contact lenses must be worn.
- Always know the hazards and physiochemical properties of the chemicals used (e.g., corrosiveness, flammability, reactivity, and toxicity) and follow OSHA Hazard Communication requirements.
- Always wear appropriate protective clothing. Confine long hair and loose clothing. Do not wear high-heeled shoes, open-toe shoes, sandals or shoes made of woven material.
- Never perform work when alone in the chemical workplace or laboratory.
- Do not eat, drink, smoke, or apply cosmetics in these areas.
- Do not perform unauthorized work, preparation, or experiments.
- Always wash hands with soap and water before leaving the work area. This applies even if gloves have been worn.

- Never engage in horseplay, pranks, or other acts of mischief in chemical work areas.
- Never remove chemicals from the facility without proper authorization.

11.2.2 Precautions for Handling Chemicals

All chemicals are potentially harmful. Avoid direct contact with any chemical. It is especially important to keep chemicals from hands, face, and clothing, including shoes or other foot coverings. Many substances are readily absorbed into the body through the skin and through inhalation. Chemicals can also enter the body through the mouth by contamination of the hands, and chemicals can be transferred to the eyes from the hands. Therefore, the following precautions are recommended:

- Do not use or handle any chemical until you read and understand the label and the Material Safety Data Sheet (MSDS) available for that chemical. MSDS's applicable to MDF and PADF operations are maintained in an updated binder in the laboratory, the health and safety sheds at both the MDF and PADF, and in the health and safety personnel trailer.
- Keep your hands and face clean. Wash thoroughly with soap and warm water whenever a chemical contacts your skin. Always wash your hands before leaving the work area, even if gloves have been worn.
- Some solvents, such as dimethyl sulfoxide, serve as vehicles for the rapid transport of dissolved toxic substances through the skin into the body. Always wear suitable gloves when handling such materials.
- All containers of chemicals must be clearly labeled. Do not use any substance from an unlabeled or doubtfully labeled container.

11.2.3 Safe Laboratory Techniques

There are a number of generally accepted laboratory techniques which will make working safer. Some of these are delineated below.

- When opening bottles, hold the bottle with its label toward your palm to protect the label (and also the hand of the next user) in case some reagent drains down the side of the bottle. Stoppers which cannot stand upside down on the bench top should be held at the base, and pointing outward, between two fingers of the pouring hand. Do not pour toward yourself. Use a funnel if the opening being poured into is small. If a stopper or lid is stuck, use extreme caution in opening the bottle.

- Never use mouth suction to fill a pipet. Use an aspirator bulb or a loose-fitting hose attached to an aspirator. Constantly watch the tip of the pipet and do not allow it to draw air.
- When carrying large bottles of corrosive, toxic, or flammable liquids, use impact-resistant transport containers.

11.2.4 Adequate Ventilation

A large number of common substances present acute respiratory hazards and should not be used in large amounts in a confined area. They should be dispensed and handled only where there is adequate ventilation, such as in a fume hood. Adequate ventilation is defined as ventilation that is sufficient to keep the concentration of a chemical below half the threshold limit value or permissible exposure limit for those chemicals for which these values have been established.

If a chemical can be smelled, it is being inhaled. Also remember that the vapors of many chemicals can be at hazardous concentrations without any noticeable odor. In many cases, a chemical's odor threshold, or lowest concentration at which a given chemical produces a noticeable odor, is listed on the MSDS and can be a valuable piece of safety information.

11.2.5 General Equipment Setup

The following recommendations apply to equipment setup in the laboratory:

- Keep work space uncluttered.
- Set up clean, dry apparatus.
- Use only equipment that is free from flaws such as cracks, chips, and obvious defects. Even the smallest chip or crack renders glassware unusable; chipped or cracked glassware should be repaired or discarded.
- A properly placed pan under a container will confine spilled liquids in the event of glass breakage.
- Fume hoods are recommended for all hazardous operations. The current U.S. Environmental Protection Agency fume hood standard is 100 linear feet per minute face velocity with fully open sash, regardless of the toxicity of the material in use. Hoods should be operating properly and obstacles that block proper air movement should not be placed inside the fume hood.

- Whenever hazardous gases or fumes are likely to be evolved, the operation must be confined to a fume hood.
- No apparatus, chemical bottles, or equipment should be placed on the floor.

11.2.6 Housekeeping

In the laboratory and elsewhere, keeping things clean and neat generally leads to a safer environment. Avoid unnecessary hazards by keeping drawers and cabinets closed while working. Never store materials, especially chemicals, on the floor - even temporarily. Work spaces and storage areas should be kept clear of broken glassware, leftover chemicals, and even scraps of paper. Keep aisles free of obstructions such as chairs, boxes, and waste receptacles. Avoid slipping hazards by keeping the floor clear. Use the required procedure for the proper disposal of chemical wastes and solvents.

11.2.7 Glassware

Glassware is commonly used in the laboratory for the preparation of standards and samples. The following items review general safe handling practices for laboratory glassware.

Glass Tubing and Stoppers

When available, ground glassware is preferable. Glass joints should be clean and dry. The use of Teflon stoppers is recommended.

Use of Glassware

Borosilicate glassware is recommended for laboratory use. Bottles, jars and other containers should be transported in carriers to protect them from breakage, as well as to limit spills in case of leaks.

Cleaning Glassware

Wear impervious gloves that have been checked to ensure that no holes are present. Avoid accumulating too many articles in the cleanup area.

Avoid the use of strong chemical cleaning agents such as nitric acid, chromic acid, sulfuric acid, strong oxidizers,

or any chemical with a "per" in its name (such as perchloric acid, ammonium persulfate, etc.), unless specifically instructed to do so, and then only when wearing proper protective equipment. A number of explosions involving strong oxidizing cleaning solutions, such as chromic-sulfuric acid mixtures, have been reported. The use of flammable solvents should be minimal and appropriate precautions must be observed. Consult with Health and Safety personnel to determined approved safety measures for a given substance.

Eye Protection

Safety eyewear must be worn for all laboratory work.

11.3 LABORATORY SPILLS

The analytical samples associated with the MDF and PADF contain numerous hazardous substances and can result in a potentially significant hazard to personnel. The following sections review general spill procedures which shall be followed.

Tables 5.1, 5.2 and 7.1 present a summary of the chemical hazards, spill response procedures, routes of exposure, and first aid for chemicals encountered on site.

11.3.1 General Procedures for Spills

The following steps are generally applicable to spills:

- Immediately alert fellow workers and supervisor in accordance with section 7.0 of this manual. All spills must be reported. If a spill response is required, consult with Industrial Hygiene to determine PPE requirements.
- For all spills, all contaminated clothing must be removed immediately and the skin washed with soap and water. Flush skin with water for no less than fifteen minutes. Clothes must be laundered before reuse (do not wash with other clothing).
- If there is no fire hazard and the material is not particularly volatile or toxic, proceed to clean it up as directed in the MSDS, including the use of proper protective clothing. To facilitate cleaning up liquids, use an absorbent material. Various commercial absorbents packaged individually (spill kits) or in bulk are available. Vermiculite and clay absorbents such as kitty litter can be more economical substitutes, but will

not control hazardous vapors. Dry sand is even less effective. A dustpan and brush should be used, and protective gloves should be worn. While wearing gloves, clean the contaminated area with soap and water and mop it dry. If the spill is on the floor, some absorbent should be sprinkled on the spot to prevent slipping. Dispose of the residue properly. CAUTION: Vermiculite and some other adsorbents create a slipping hazard when wet.

- If a volatile, flammable, or toxic material is spilled, immediately warn everyone to extinguish flames and turn off spark producing equipment such as brush-type motors. Shut down all equipment and evacuate the area until it is decontaminated. Section 7 of this Health and Safety plan contains definitions and required actions depending on the severity of the spill and the chemical involved. The supervisor or management will be responsible for designating the extent of evacuation and the proper cleanup procedure.
- Avoid skin contact and to prevent inhalation wear appropriate breathing apparatus. Clothing contaminated by spills or splashes should be removed immediately to prevent skin penetration.
- Many small liquid spills (<100 ml) can be absorbed with paper towels, sand, or an absorbent. However, paper towels can increase the surface area and evaporation, increasing the fire hazard. Do not leave paper towels or other materials used to clean up a spill in open trash cans in the work area. Dispose of them properly.

11.3.2 Chemicals on the Skin

For spills covering a small amount of skin, immediately flush with water for no less than fifteen minutes. If there is no visible burn, wash with warm water and soap, removing any jewelry to facilitate removal of any residual materials. Check the MSDS to see if any delayed effects should be expected. If a delayed reaction is noted, seek medical attention immediately and explain carefully what chemicals were involved.

For larger spills, quickly remove all contaminated clothing while using the safety shower, and have a co-worker call extension 2911 to initiate an emergency medical team response. Do not attempt to wash chemicals from clothing while wearing it, instead, remove the clothing immediately. Seconds count, and no time should be wasted because of modesty. Be careful not to spread the chemical on the skin, or especially into the eyes. Unless the eyes are affected, do not remove safety goggles until all chemicals are washed from the hair and face. Use caution when removing pullover shirts or sweaters, to prevent contamination of the eyes. It may be better to cut the garments off. Immediately flood the affected body area with temperate water for at least 15 minutes, and resume flushing the affected areas if pain returns. Do not use creams, lotions, or salves, and get medical attention as soon as possible.

11.3.3 Chemicals in the Eye

For chemical splashes, at least a 15-minute flush is recommended. Extension 2911 must be called at once. Immediately flush the eye with a copious amount of water under gentle pressure, checking for and removing contact lenses at once. However, contact lenses may be difficult to remove, and the essential irrigation must not be delayed for contact removal. Forcibly hold the eye open to wash thoroughly behind the eyelids. Eyeballs should be rotated so that all surfaces are rinsed. In the absence of some type of eyewash device, the injured person should be placed on his or her back and water gently poured into the eye. The injured eye must be held open. After flushing, the victim must be given prompt medical attention, regardless of the severity (or apparent lack of severity) of the injury. Keep the eyes covered with the clean, wet, soft, cold pads while transporting the injured to medical attention.

11.4 CHEMICAL STORAGE AND DISPOSAL

Laboratory storage of solvents should be kept to a minimum. They should be placed on a low shelf, preferably in a tray adequate to contain spills or leakage. Incompatible materials should not be stored together or in close proximity.

Careless disposal of chemicals can cause problems. The wrong two chemicals spilled together on a bench or put into the same disposal container can catch fire spontaneously or explode. Broken glass in a waste paper basket can injure the person who empties that basket.

In addition, strict federal, state and local environmental rules cover most laboratory wastes. These regulations must be strictly followed. The Health and Safety Officer or a hazardous waste expert should be consulted for compliance information. Waste Operations personnel can provide guidance on managing any waste stream at RFETS.

Safety can be promoted by following a few common-sense practices when disposing of chemical wastes.

- To minimize disposal problems, always specify the smallest amount needed when ordering chemicals.
- Obtain directions for disposal from the supervisor. Strict Federal and State rules apply to the disposal of hazardous waste.
- Dispose of surplus chemicals promptly.
- Do not store waste containers open, have the cap and cover in place.

- When disposing of chemicals, one basic principle applies: Keep each different class of waste chemical in a separate disposal container.

Put ordinary paper waste in a wastepaper basket separate from chemical wastes. If a piece of paper is contaminated, such as paper towels used to clean up a spill, put the contaminated paper in a special container marked for this use. It must be treated as a chemical waste.

Broken glass belongs in its own marked waste container for "sharps". Place broken plastic apparatus in a marked waste container that is different than the broken glass container.

For leftover and unused chemicals, put liquid in its own specially marked container. Close these containers after each such use. Liquid chemicals may be put down the drain only if they are clearly nonhazardous.

11.5 SAFETY EQUIPMENT AND PROTECTIVE CLOTHING

11.5.1 Safety Equipment

There is a certain minimum amount of safety equipment which shall be available for all personnel engaged in laboratory work.

Eye Washes/Emergency Showers

An eyewash station is located in the T891C laboratory where sampling chemicals are stored. It is set to deliver a gentle flow of tempered, potable, aerated water and is tested weekly to ensure proper operation. It must be understood by all that eye protection is more important than eye washes. Safety showers are located in the T891Q shower trailer and Building 891. Safety showers are inspected on a weekly basis for proper operation.

Fume Hoods

Fume hoods serve to control toxic, offensive, or flammable vapors. The effective operation of a hood depends on many factors including face airflow velocity, the general ventilation pattern of the areas, and the methods of working at the hood. A routine performance test using an anemometer will be conducted at least annually to ensure that adequate airflow (100 feet/minute face velocity) is maintained. Smoke tube testing will also be conducted at least annually since they are a good indicator of flow direction. Equipment should be placed as far back in the hood as

practical and activities carried out at least 15 cm (6 in) from the front edge of the hood. The head should be kept outside of the hood face. Hoods should never be used for storage of chemicals. Chemicals should be stored in appropriate locations. Remember that in the event of an accident or fire every item in the hood may be involved, including those stored in the hood.

11.5.2 Protective Clothing

Level D protective equipment as defined in section 8 of this Health and Safety plan is the standard field work uniform for all personnel directly involved in MDF and PADF operations.

Gloves

Gloves can serve as an important part of personal protection when they are used correctly and are required when handling chemicals. Do not use gloves with cracks or small holes to protect against chemical exposure. Used gloves will be removed before leaving the work area and before handling such things as telephones, doorknobs, writing instruments, and laboratory notebooks in order to prevent the unintentional spread of chemicals or other laboratory hazards.

In general, Nitrile gloves are required for handling laboratory chemicals. However, a wide variety of gloves are available to protect against chemical exposure. Examine the manufacturer's claims and test data carefully before wearing any other type of gloves.

Be aware that if a chemical diffuses through a glove, that chemical is held against the worker's hand and the person is then possibly more exposed to the chemical than if he or she were not wearing gloves. Be certain the manufacturer's or supplier's information on compatibility with the specific chemicals you are using conforms to the ASTM, Standard Test Methods for Chemical Permeability (ASTM F-739). Contact the Health and Safety Manager for guidance on glove selection.

APPENDIX A: HEAT STRESS GUIDELINES

RMRS Rocky Mountain Remediation Services, L.L.C.
protecting the environment

INTEROFFICE MEMORANDUM

DATE: July 8, 1996

TO: Distribution

FROM: Ricky J. Carr, Environmental Safety &Health, Bldg. T664A, X2970

SUBJECT: HEAT STRESS - RJC-014-96

Action: None Required

The purpose of this memo is to provide guidance regarding the prevention and monitoring of heat stress conditions. It should be noted that heat stress related conditions or disorders (i.e. heat stroke, heat exhaustion) are considered to be occupational illnesses by OSHA and therefore are recordable cases. It is incumbent to prevent, monitor and mitigate conditions which may lead to heat stress among employees.

There is a draft Heat Stress Program that has been written by Kaiser-Hill L.L.C. (K-H) Industrial Hygiene and Safety and reviewed by the Industrial Hygiene and Safety organizations of the major subcontractors. This Heat Stress Program describes the responsibilities of various personnel regarding implementation of the Program and contains instructions for monitoring heat stress and provides guidelines for Threshold Limit Values (TLVs) and work/rest regimens. DOE Order 440.1, Worker Protection Management for DOE Federal and Contractor Employees requires compliance with the most recent edition of the ACGIH "Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices" when TLVs are more protective than OSHA Permissible Exposure Limit (PELs) (there is no OSHA PEL for heat stress). The work/rest regimens specified in the Heat Stress Program are based upon the ACGIH TLVs modified by professional judgment for the use of impermeable personal protective clothing (PPE). These TLVs assume that the workers exposed to heat stress conditions are acclimatized.

It is (will be) Rocky Mountain Remediation Services (RMRS) policy to adhere the requirements of the Heat Stress Program including the work/rest regimens contained as Appendix 1 of the Program (attached). Prevention of potential heat stress conditions is the first method to be considered when heat stress is identified as a potential hazard associated with any activity or task. Prevention methods to be considered include work schedule, modification of task/activity, and provision for rest areas. The Heat Stress Program provides instructions for monitoring heat stress conditions using the Wet Bulb Globe Temperature (WBGT) Index. WBGT accounts for air temperature, relative humidity, and solar load and provides a mechanism for correlating environmental conditions with body temperature and other physiological responses to heat stress. The Heat Stress Program contains a Table for work/rest regimens based upon the WBGT Index, work activities, and level of Personal Protective Equipment (PPE). Work/rest regimens shall be established in accordance with guidelines in the Table with the following interpretations. Physiological monitoring (i.e. body temperatures, pulse rates) will be performed whenever practical and feasible in order to verify the work/rest regimens are appropriate considering the WBGT Index. The use of personal cooling devices such as ice vests or vortex cooling can be used to modify the WBGT Index

for a particular work activity and level of PPE. The WBGT Index can be lowered by 3∞ F if a personal cooling device is employed and physiological monitoring is performed to confirm that the personal cooling devices are effective (using the monitoring guidance provided on page 8-21 in the NIOSH/OSHA/USCG/EPA Occupational Safety and Health Guidance Manual for Hazardous Waste Activities). Additional modification to the WBGT Index when personal cooling devices are employed when be evaluated on a case-by-case basis. Column 2 will be employed if permeable protective clothing (regardless of respiratory protection) is utilized. Permeable protective clothing includes cotton and Kleenguard" coveralls. Column 3 will be employed if semi-permeable protective clothing (Tyvek) is utilized. Column 4 will be employed if impermeable protective clothing (Saranex) is utilized.

Please distribute this guidance to all personnel that have operations affected by heat stress considerations. Please don not hesitate to call if you have questions or comments.

RJC:clh

Attachment:
As Stated

Distribution

R. E. Bates
G. W. Beers
R. J. Carr
M. E. Findley
K. D. Jenkins
O. McAfee
R. A. McCafferty
A. W. Medina
T. T. Sangaline
M. D. Schrenkengast
T. N. Timmons

cc:

G. Aguero
C. A. Benson
C. Boardman
J. Chapin
J. A. Cuicci
C. S. Evans
R. C. Fitz
T. D. Gray
L. F. Johnson
J. E. Law
D. E. Steffen
M. R. Wagner
M. Wheeler
ESH&Q File
RMRS Records Center

RFETS HEAT STRESS PROGRAM

HEAT STRESS GUIDELINES FOR LIGHT WORK

(1)		(2)	(3)	(4)
WORK/REST	WBGT°F	WBGT°F	WBGT°F	WBGT°F
Continuous	86	76	72	68
75/25%	87	77	73	69
50/50%	89	78.5	74.5	70.5
25/75%	90	79.9	75.9	71.9

HEAT STRESS GUIDELINES FOR MODERATE WORK

(1)		(2)	(3)	(4)
WORK/REST	WBGT°F	WBGT°F	WBGT°F	WBGT°F
Continuous	80	70	66	62
75/25%	82	72.4	68.4	64.4
50/50%	85	74.9	70.9	66.9
25/75%	88	77.9	73.9	69.9

HEAT STRESS GUIDELINES FOR HEAVY WORK

(1)		(2)	(3)	(4)
WORK/REST	WBGT°F	WBGT°F	WBGT°F	WBGT°F
Continuous	77	67	63	59
75/25%	78	68.6	64.6	60.6
50/50%	82	72.2	68.2	64.2
25/75%	86	76	72	68

(1) No Personal Protective Equipment
(2) One pair coveralls (Anti C), modesty garments, gloves, hood, shoe covers.... (Level D Haz Mat PPE)
(3) Two pair coveralls (Anti C), modesty garments, gloves, hood, shoe covers....
or
One pair coveralls (Anti C), modesty garments, gloves, hood, respirator. (Level C Haz Mat PPE)
(4) Two pair coveralls (Anti C), modesty garments, gloves, hood, shoe covers, respirator. (Level A&B Haz Mat PPE)

Figure 2.2 RFETS Operable Units Map

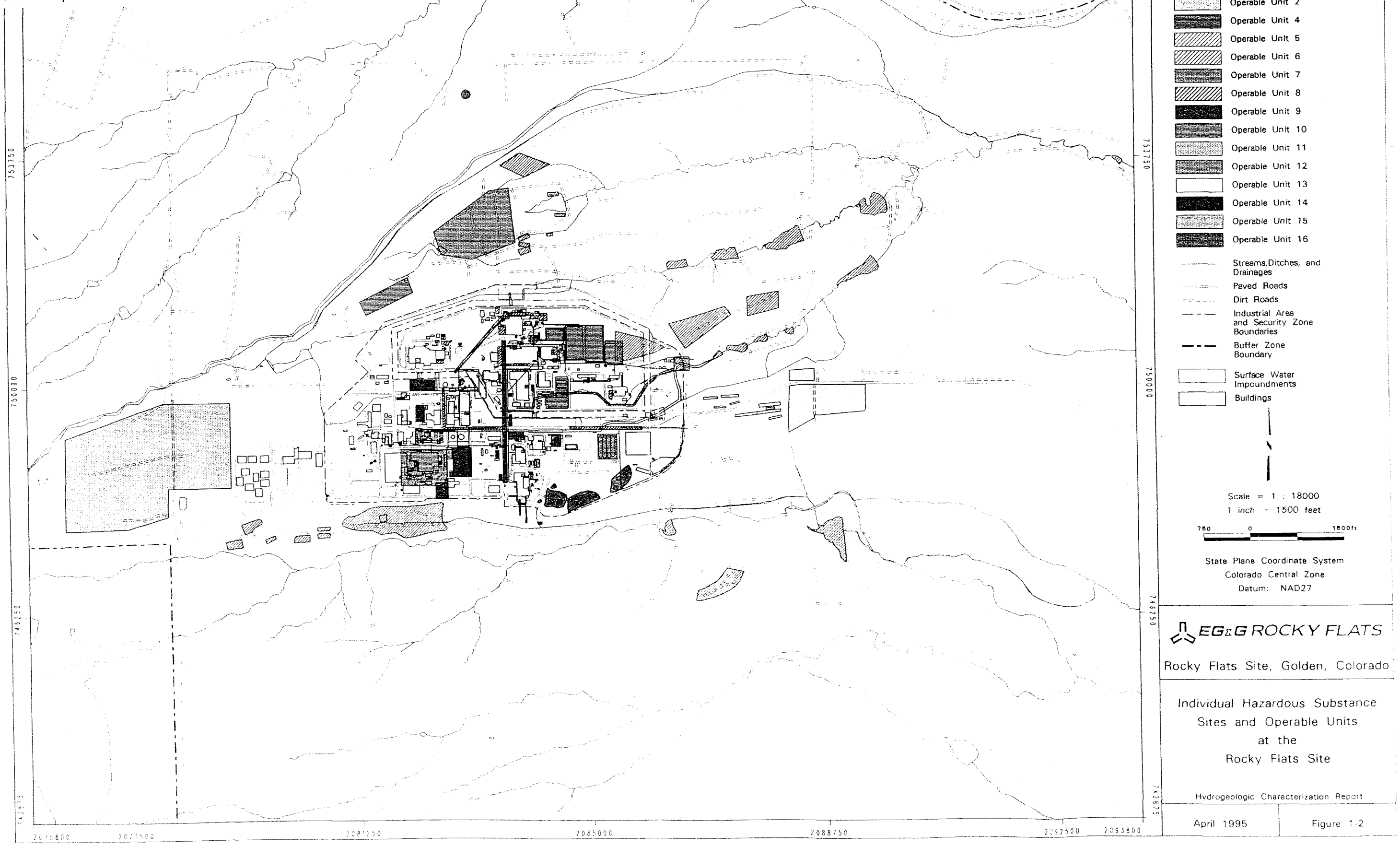
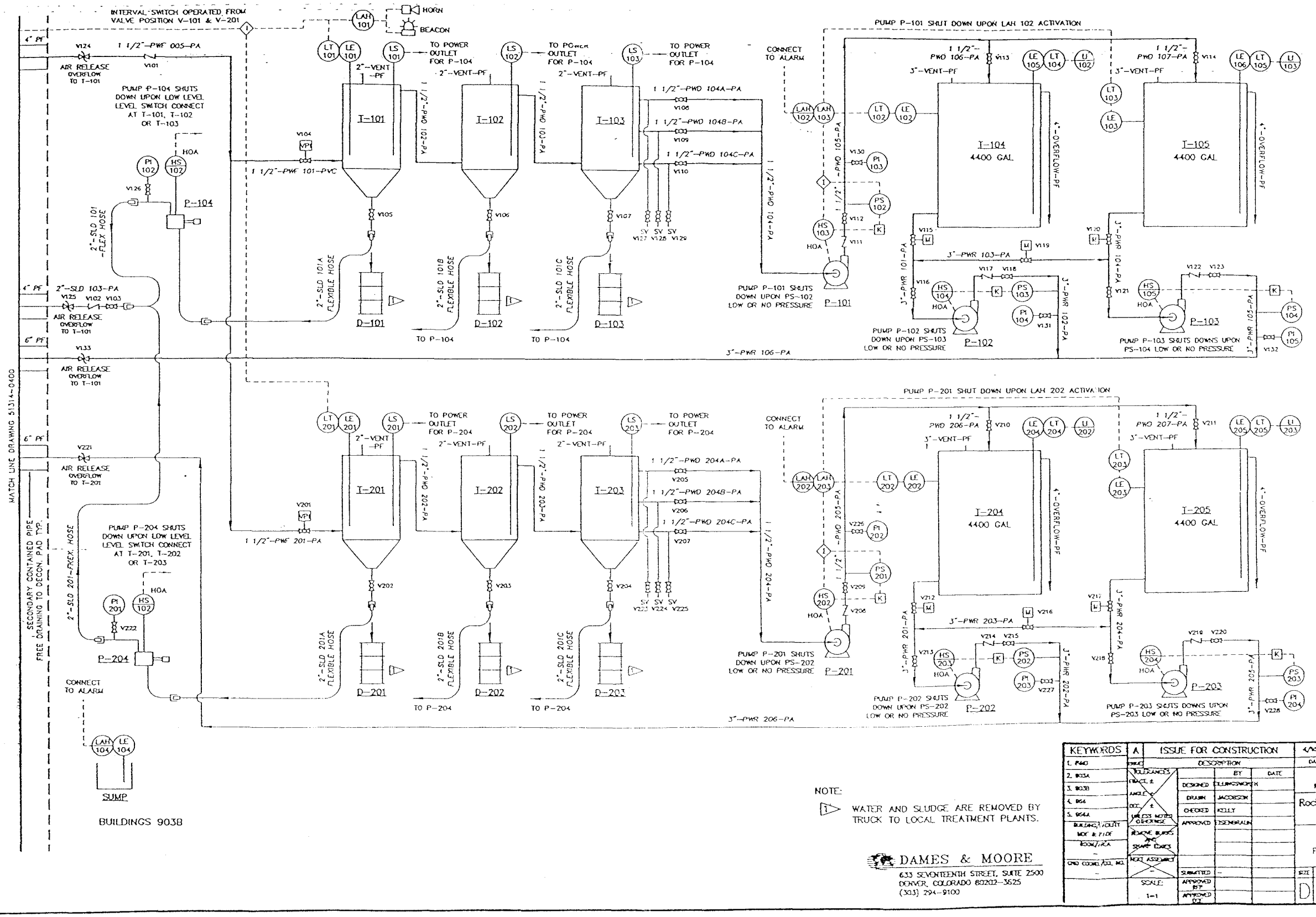


Figure 3.3 Main Decontamination Facility Process Flow Diagram



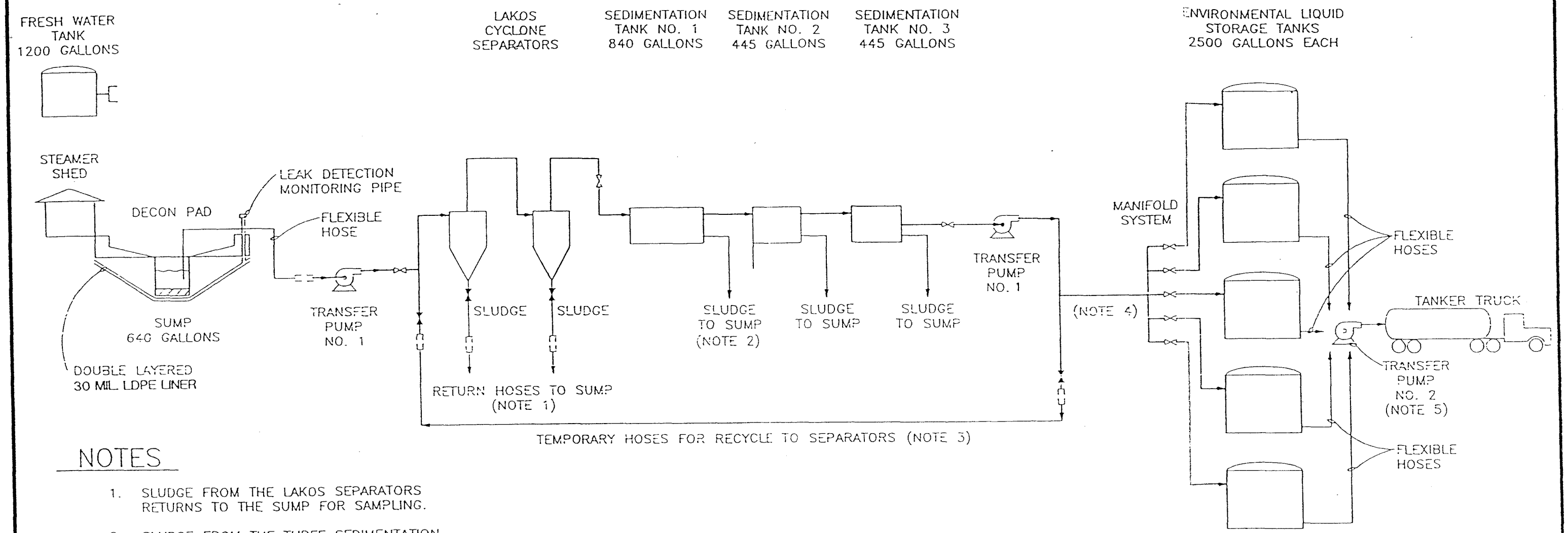
NOTE:

1. WATER AND SLUDGE ARE REMOVED BY TRUCK TO LOCAL TREATMENT PLANTS.

DAMES & MOORE
633 SEVENTEENTH STREET, SUITE 2500
DENVER, COLORADO 80202-3625
(303) 294-9100

KEYWORDS	A	ISSUE FOR CONSTRUCTION	4/14/95						95K457
1. P&ID	MARK	DESCRIPTION	DATE					DOE CLASS	JOB NO.
2. 9035	TOLERANCES		BY	DATE	U.S. DEPARTMENT OF ENERGY				
3. 9038	FRACT. ±		DESIGNED	CLEMSNOSKI	ROCKY FLATS FIELD OFFICE GOLDEN, COLORADO				
4. 866	ANGLE ±		DRAWN	JACOBSON	Rocky Flats Environmental Technology Site				
5. 9044	DEC. ± UNLESS NOTED OTHERWISE		CHECKED	KELLY	GOLDEN, COLORADO				
BUILDING/VAULT NOT A PART	REMOVE BURRS AND SHARP EDGES		APPROVED	CSENDRALN	DECON PAD UPGRADES				
ROOM/AREA	MAT'L ASSIGNMENT				PIPING & INSTRUMENTATION DIAGRAM				
CMD CODE/ADD. NO.		SUBMITTED			SIZE	DRAWING NUMBER	ISSUE	SHEET	
	SCALE: 1=1	APPROVED BY			D	51314-0401	A	21 of 37	
		APPROVED DOE							

Figure 3.4 Protected Area Decontamination Facility Process Flow Diagram



NOTES

1. SLUDGE FROM THE LAKOS SEPARATORS RETURNS TO THE SUMP FOR SAMPLING.
2. SLUDGE FROM THE THREE SEDIMENTATION TANKS IS REMOVED BY HAND AND RETURNED TO THE SUMP FOR SAMPLING.
3. WATER FROM THE THIRD SEDIMENTATION TANK CAN BE RETURNED TO THE LAKOS SEPARATORS VIA TRANSFER PUMP NO. 1 IF THE WATER IS DETERMINED THROUGH VISUAL INSPECTION TO BE NOT CLEAR.
4. TRANSFER PUMP NO. 1 ALSO TRANSPORTS WATER THROUGH THE MANIFOLD AND INTO THE SELECTED STORAGE TANKS.
5. FLEXIBLE HOSES CAN BE USED TO ALLOW TRANSFER PUMP NO. 2 TO TRANSPORT WATER FROM THE STORAGE TANKS THROUGH THE MANIFOLD AND TO THE TANKER TRUCK.

Golder Associates Denver, Colorado

CLIENT/PROJECT EG&G - ROCKY FLATS DECONTAMINATION FACILITY HEALTH AND SAFETY PLAN

TITLE TYPICAL DECONTAMINATION FACILITY PROCESS FLOW DIAGRAM

DRAWN	BDL	DATE MARCH 1994	JOB NO. 933-2672
CHECKED	CER	SCALE 1"=50'	DWG. NO./REV. NO.
REVIEWED	WEH	FILE NO.	FIGURE NO.